Chattagram International Dental College
Journal
Volume 06 Issue 01 January 2023

BMDC Approved

ISSN 2707-2185

Chattagram International Dental College (CIDC) Journal

EDITORIAL BOARD

Published by : Professor (Dr.) Shahiqul Jabbar
Professor & Head
Department of Orthodontics and Dentofacial Orthopedics
Chattagram International Dental College
206/1, Haji Chand Meah Road, Shamserpara, Chandgaon
Chattogram, Bangladesh.
Cell : 01753 20 03 23, Phone : (031) 2573119-23
E-mail : shahique_ jpni@yahoo.com, www.cidch.edu.bd

Printed by : New Computer Suporna
Chattogram
Cell : 01819 80 30 50
Email : abedulhuq1960@gmail.com
supornacomputer@yahoo.com

Chattagram International Dental College
206/1, Haji Chand Meah Road, Shamserpara, Chandgaon, Chattogram, Bangladesh.
Cell : 01753200323, Phone : (031) 2573119-23, E-mail : info.cidchbd@gmail.com
Website : www.cidch.edu.bd

Information to Authors

Chattagram International Dental College (CIDC) started its historical and memorable journey in the 2003 year. CIDC is the only Private Dental College in Chattogram which is smoothly running under the guidance of Chattogram University.

CIDC is approved by the Government of the Peoples Republic of Bangladesh and is recognised by the Bangladesh Medical and Dental Council (BMDC). CIDC is representing pioneer and exemplary academic and clinical oriented research institute of Bangladesh. About 65 Dental students completed their graduation from CIDC per annum.

Chattagram International Dental College commenced to publish a peer reviewed Journal from 1st January 2018 which is recognized by BMDC and having International Standard Serial Number (ISSN) 2707-2185. The journal intend to publish article of authors from any part of the globe, but has a special interest in publishing research articles of authors from Bangladesh and of relevance to developing countries. It interested in Editorial, Original (Research) articles, Special articles, Review articles, Short Communications, Case report and letters on new findings of Medical Science.

Chattagram International Dental College Journal is published in english, biannually eg. January and July with prior approval of Editorial board.

Appropriate measures has been taken to make the journal indexed / abstracted in major international indexing systems including the PubMed/MEDLINE, Index Medicus, Google Scholar, DOAJ, Hinari and Scopus etc.

Submission of Manuscript

Manuscript (Papers) are submitted to the Editor-In-Chief or authorised persons at any time. Papers accepted for publication are subjected to peer review and editorial revision. With full title (Title should be concise and informative) two copies of papers (Along with CD) accompanied by a covering letter signed by Principal and Co-authors including name, academic degrees, designation, the departmental and institutional affiliation. Complete address, Cell number including Email address of Corresponding author should be mentioned. Not more than 7 (Seven) authors will be accepted for all manuscripts.

Manuscript should be typed in English (Font size and style : 10, Times New Roman) on one side of white bond paper of A4 size with margins of at least 2.5 cm, using double space throughout.

Manuscript may be additionally submitted by email also. Email : shahique_ jpni@yahoo.com Ms word 2003/2007). Rejected manuscript will not be returned.

Abstract

A structured abstract should not be of more than 250 words. It should be a factual description of the study performed organized with the heading of Background (Includes aim or objectives) Methods (Includes patient population, procedures and data analysis) Result and Conclusion. The abstract should contain the data to support the key findings or conclusions of the study and this should be self explanatory without references to the text. the first time an abbreviated term is used it should be spelled out in full form and follow with the abbreviation in parentheses for example :- CKD (Chronic Kidney Disease). Please do not cite any references in the abstract.

3 (Three) to 10 (Ten) key words may be provided below the abstract using terms from the medical subject heading (Index Medicus, NLM, USA).

Types of Manuscripts

Editorial : Its a invited article. Based on current affairs of Medical Science with any disciplines. Maxium length of the editorial may be with in 1200-1500 words and number of references maxium in 10 (Ten).

Original Article : A research, observational and experimental article should be devided into the following sections with headings :

- Introduction
- Materials and methods
- Result
- Discussion
- Limitation
- Conclusion
- Recommendation
- Acknowledgements
- Disclosure

Single digit numbers used in the text should be in words except datas and reference numbers. Maximum length of text may be with in 3500-4500 words (Excluding abstract, table, figure and references). The total number of reference should not be less than 15 (Fifteen) for the original article.

Special Article / Short Communication

Its a medical based text of any disciplines. Maximum length of the Special article / Short Communication may be with in 2500-3000 words (Excluding abstract, table, figure and references). The total number of reference should not be less than 10 (Ten).

Review Article

Its a prestigious article, which is divided into the following sections with headings

- Introduction
- Search Strategy
- Discussion
- Conclusion
- Disclosure

Review article should not generally exceed 8500 words, including illustrations and the number of references should not be more than 30 (Thirty). According to guidelines of BMDC, Review article should be written by senior author, who have written a minimum of 02 Original research articles and 04 Case reports on the same topic.

Case Report

Text of Case report with the following section

- Introduction
- Case Report
- Images (If any)
- Discussion
- Figure / Legends (If any)
- Conclusion
- Disclosure

Maximum length of the text may be with in 2000-2500 words (Excluding abstract and references). The total number of reference should not be less than 10 (Ten).

Letter

Letter should be brief and to the point with in 500-600 words only.

It is noted that standard abbreviations should be used whenever. The full form for which the abbreviations stands followed by the abbreviation in parenthesis should preceede the use of the abbreviation in the text except for standard ones like $45^{O}c$, 35mg/L etc in all types of text.

References

Regarding references please follow the Vancouver style (Uniform requirements for manuscripts submitted to biomedical journals prepared by the International Committee of Medical Journal Editors (ICMJE guideline http://www.icmje.org).

Reference citations in the text should be numbered in arabic numerals at the end of the sentence eg [1,2] consecutively in order in which they are mentioned in the text.

Book references should have the name of the authors, chapter title, editors, Book name, the edition, place of publication, the publisher, the year and the relevant pages.

Journal references should have the name of the authors, title of the article, editors, name of the journal volume and issue number, place of publication, the publisher, the year and relevant pages.

The first six authors of a work should be named, followed by 'et al' if there are more than six. If less than six authors the name of the all authors may be mentioned.-

Examples

Book reference : Stoll BJ, Shane AL. Infections of the neonatal infants in RM Kliegman, BF Stanton, JWS Geme, NF Schor. Nelson text book of pediatrics. 20th edn. Elsevier. Philadelphia. 2016;1:909-925.

Journal reference : Al-Mohaimeed A. Medical faculty development: Perceptions about teachers' characteristics. Journal of Taibah University Medical Sciences. 2015;10(4): 405-410.

Citation from a website : Wolf B. Clinical issues and frequent questions about biotinidase deficiency. Molecular Genetics and Metabolism. 2010; 100(1):6-13.http:// dx.doi.org/ 10.1016/j. ymgme. 2010.01. 003 PMid: 20129807.

Table

- All tables should be numbered using Roman numerals (I, II).
- Table should always be cited in text in consecutively using Roman numericals (eg Table I, II).
- Mentioned the caption at the top of table. Table should be planned as brief as possible.
- Significance values and other statistical data should be included beneath the table.

Figures / Graphs

- All Figures / Graphs are to be numbered using Arabic numericals (1, 2).
- Figures / Graphs always to be cited in text in consecutively using Arabic numerical (eg Figure 1, 2).
- Provide a caption at the bottom for each figures / graphs.
- Reduce figures / graphs to fit either in one column or within the two column width of the journal page.

According to guidelines of the Internation committee of Medical Journal Editors (http:// www.icmje.org) please provide only 4/5 table with Roman numerical I, II with caption at the top of the table and only 4/5 figures / graphs with Arabic numerical 1, 2, with caption at the bottom of the figures / graphs.

Images / Photographys / Legends

Unmounted glossy print, B-2 size with good contrast (600 pixels). 3 Images / Photographys / Legends are allowed for whole text.

Declaration

The article should accompany a declaration signed by author and co-authors which includes a statement that neither the article nor any part of its essential subtance table or figures is published in any journal nor submitted elsewhere for consideration of publication before appearing in this journal. The declaration form must be collected from the office of Editor-In-Chief

Department of Orthodontics and Dentofacial Orthopedics
Chattagram International Dental College
206/1, Haji Chand Meah Road, Shamserpara,
Chandgaon, Chattogram, Bangladesh.
Cell : 01753200323, Phone : (031) 2573119-23
E-mail : shahique_ jpni@yahoo.com
Website : www.cidch.edu.bd

Competing Interests

Chattagram International Dental College Journal requires authors to declare any competing financial or other interest in relation to their work. Where an author gives no competing interests, the listing will read the author (s) declare that they have no competing interests.

Editorial

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 1-2

Climate Change : The Most Significant Health Threat Facing Humanity

Farid Uddin Ahmed[1*]

Climate change is humanity's single most significant health threat and health professionals worldwide are already responding to the health harms caused by this unfolding crisis. While no one is safe from the serisks, the people whose health is being harmed first and worst by the climate crises are the people who contribute least to its causes and who are least able to protect themselves and their families against it - people in low-income and disadvantaged countries and communities.

The climate crisis threatens to undo the last fifty years of progress in development, global health and poverty reduction and widen existing health inequalities between and within populations. It severely jeopardizes the realization of universal health coverage in various ways including compounding the existing burden of disease and exacerbating existing barriers to accessing health services, often when they are most needed. Over 930 million people - around 12% of the world's population spend at least 10% of their household budget to pay for health care. The poorest people largely uninsured, health shocks and stresses already push around 100 million people into poverty every year, with the impacts of climate change, worsening this trend.

Climate change is impacting human lives and health in a variety of ways. It threatens the essential ingredients of good health clean air, safe drinking water, nutritious food supply and safe shelter and has the potential to undermine decades of progress in global health. Climate changes already impacting health by leading to death and illness from increasingly frequent extreme weather events, such as heat waves, storms and floods, the disruption of food systems, increases in zoonoses and food water and vector-borne diseases and mental health issues. Furthermore, climate change undermines many social determinants for good health, such as livelihoods, equality, access to health care and social support structures. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged, including women, children, ethnic minorities, poor communities, migrants or displaced persons, older populations, and those with underlying health conditions.

Ecologic alterations triggered by climate change can increase malnutrition rates, allergies, and exposure to mycotoxins, vector-borne diseases (Malaria, dengue, encephalitides, Lyme disease) and emerging infectious diseases. Within the next twenty years, temperatures are likely to rise by more than 1.5℃ above pre-industrial levels, increasing heat waves, longer warm seasons, and shorter cold seasons, according to the latest Inter governmental Panel on Climate Change (IPCC) report released. Assuming emissions keep rising at current levels and that the global population grows to about 9.4 billion by 2078 (It is currently almost 7.9 billion) they estimated that 89.3% of the worldwide population some 8.4 billion people could be at risk of malaria by 2078, compared with 75.6% of the population at the end of the last century. For dengue, the study suggested that 90% of the global population some 8.5 billion people could be at risk by 2080, compared with 77% from 1978-1999. The dengue transmission season could increase by up to four months in tropical low land areas in southeast Asia, sub-Saharan Africa and the Indian subcontinent. The disease may become more common place across central-northern Europe and the northern USA.

Climate change may also increase the risk of water borne diseases like cholera. Droughts can also degrade water quality. For instance, reduced water availability and the stagnation of the water supply have been associated with increased rates of diarrhea in the Pacific Islands. At the sametime, a three-month drought in Africa forced livestock to rely on human drinking water sources, resulting in people being exposed to disease-causing *E. coli* O157 bacteria. Heavy rainfall or flooding can sweep pathogens in human excrement or animal manure from fields and sewers into rivers, lakes and wells, contaminating fresh produce and drinking water. In urban settings, heavy rainfall and surface water run off can also compromise the clearance capacity of water treatment works, affecting the purity of municipal drinking water. Heat exposure can also aggravate several chronic diseases, including cardiovascular and respiratory diseases. Climate conditions can potentially affect both health and productivity in occupational settings. Heat, temperature variability, and air-pollution increase mortality risk in

1. Associate Professor of Community Medicine
Rangamati Medical College, Rangamati.

*Correspondence to :
Dr. Farid Uddin Ahmed
Cell: 01727 78 97 00
Email : fuahmed_34@yahoo.com

Date of Receipt : 07-06-2022
Date of Acceptance : 20-06-2022

older people, especially from cardiovascular and respiratory diseases. Floods are linked with increasing post-traumatic stress disorder, depression and anxiety incidences. Facing these adversities, older people exhibit both vulnerability and resilience.

The IPCC has concluded that to avert catastrophic health impacts and prevent millions of climate change-related deaths, the world must the limit temperature rises to 1.5℃. Several interventions will be needed to adaptto a warmer and more urbanized world's health effects and prepare for all scenarios. It is essential to increase surveillance in potential hotspot areas to monitor the emergence of diseases, especially in places without previous experience with dengue or malaria. Public health action will be significant inareas where transmission is occasional because public health systems might be unprepared to control and prevent these diseases. Other important public health interventions to reduce the disease burden of high-priority climate sensitive conditions included environmental interventions to control vectors, chemoprophylaxis, immunization, household and community water treatment, greening cities and community advice. Proactive and preventive physician action, research focused on the differential effects of climate change on sub populations, including children and policy advocacy on the individual and federal levels could contain climate change and inform appropriate prevention and response.

Bibliography

1. Pörtner HO, Roberts DC, Adams H, Adler C, Aldunce P, Ali E et al. Climate change 2022: Impacts, adaptation and vulnerability. IPCC Sixth Assessment Report. 2022.

2. Climate Change 2021: The Physical Science Basis. IPCC Sixth Assessment Report. 2021

3. Hulme M. Intergovernmental Panel on Climate Change (IPCC). International Encyclopedia of Geography: People, the Earth, Environment and Technology. 2016; 12:1-7.

4. Bunyavanich S, Landrigan CP, McMichael AJ, Epstein PR. The impact of climate change on child health. Ambulatory pediatrics. 2003;3(1):44-52.

5. Langkulsen U, Vichit-Vadakan N, Taptagaporn S. Health impact of climate change on occupational health and productivity in Thailand. Global health action. 2010;3(1):5607.

6. Leyva EW, Beaman A, Davidson PM. Health impact of climate change in older people: an integrative review and implications for nursing. Journal of Nursing Scholarship. 2017;49(6):670-678.

7. Bouzid M, Hooper L, Hunter PR. The effectiveness of public health interventions to reduce the health impact of climate change: A systematic review of systematic reviews. PloS one. 2013;8(4):e62041.

Original Article

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 3-6

Study on Marginal Accuracy of Provisional Restorations Fabricated by Indirect Technique

Marium Choudhury[1*] Kazi Shagufa Yazdi[2] Mohammad Shamsuzzaman[3]
Nurun Nahar[4] Khadizatul Kobra[5] Khadizatul Kobra[6]

Abstract

Background: *Provisional restoration has significant role to protect the prepared tooth during the period between tooth preparation and insertion of final prostheses. By maintaining the biological, mechanical and esthetic properties, it facilitates the easy insertion of the final prostheses as well as it maintains patient's comfort also. Several laboratory and clinical techniques are used to fabricate provisional restoration, such as direct techniques for both single and multiple units of restorations. To evaluate the marginal accuracy of the provisional restorations fabricated by indirect technique.*

Materials and methods: *It was a prospective comparative study carried out in the Department of Prosthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University during the period of January 2006 to December 2007. The patient with fractured tooth, missing teeth or endodontically treated teeth, discolored tooth, who attended for in the Out Patient Department of Prosthodonics, faculty of dentistry. Total 20 patients were treated with provisional restorations fabricated by indirect technique. The patients who have para functional habits were excluded in this study. After insertion of the prostheses, patients were observed clinically and evaluation was done after 7 days and 15 days. Data were collected and analyzed using chi-square test p<0.05 was considered as statistically significant.*

Results: *This study shows highest number of patients was in group of 21 – 30 years. The mean age was 36.8 ±12.6 years. In 7(35%) were male and 13(65%) were female. Marginal adaptation of provisional restoration, after 7 days 15 (75%) patients were in grade-l, 5(25%) patients in grade II. After 15 days 15 (75%) patients in grade I and 25% in grade II. Biocompatibility of provisional restoration, after 7 days all patients were in grade-l. After 15 days, 19(95.0%) patients and 5% were in grade-ll. Aesthetic status of provisional restoration, after 7 days all patients were in grade-l. After 15 days,19(95.0%) patients were in grade-l.*

Conclusion: *This study revealed that the provisional restorations fabricated by indirect technique provide better marginal adaptation, and less response to gingival tissue, and esthetic status.*

Key words

Provisional restoration; Peridontal treatment; Prosthetic care.

Introduction

Provisional restorations have evolved through significant change during the past several decades. Probably the most stimulators of change is provisional restoration have been major amount of fixed prosthodontic therapy.[1]

Provisional restorations are fabricated to protect the prepared tooth structure during the period between the preparation and insertion of the final restoration.[2] After tooth preparation a temporary protective or functional restoration is fabricated over the prepared tooth to be used until the fabrication of the final prostheses. Temporary restorations usually fabricated and provided on the same day of tooth preparation.[3]

Provisional restorations can also be used for extended treatment intervals by providing long term tooth protection and stabilization during adjunctive periodontal and endodontic treatment procedures.[4,5] Periodontal treatment is a part of comprehensive prosthetic care. These provisional restorations provide a matrix against which the soft tissue heals, guiding the generation of correct soft tissue architecture.[6]

Mechanically the provisional restorations, during function, must resist functional loads that occur during chewing as well as resist removal forces without fracturing.[7] To reduce the risk of fracture, the inter-abutment connector size must be increased for strength, thus limiting esthetic and biologic requirements. The

1. Associate Professor of Periodontology and Pathology Bangladesh Dental College, Dhaka.
2. Associate Professor of Paediatric Dentistry Bangladesh Dental College & Hospital, Dhaka.
3. Associate Professor of Science of Dental Materials Bangladesh Dental College, Dhaka.
4. Associate Professor of Conservative Dentistry and Endodontics Bangladesh Dental College & Hospital, Dhaka.
5. Assistant Professor of.Science of Dental Materials Delta Medical College (Dental Unit) Dhaka.
6. Assistant Professor of Dental Pharmacology Bangladesh Dental College, Dhanmondi, Dhaka.

*Correspondence to :
Dr. Marium Choudhury
Cell: 01715 02 80 83
Email : mariumchoudhury@yahoo.com

Date of Receipt : 28-11-2022
Date of Acceptance : 20-12-2022

inter-abutment alignment, dimensional stability, and marginal integrity can be achieved by reinforcing the provisional restoration with a wire of fibers.[8] The strength is determined by the material's resistance to crack propagation.[9]

Good periodontal health can be created by developing the appropriate contour, and good gingival adaptation and embrasure space of the prostheses for the particular situation. Broad embrasure space can cause impaction and blunting of the papilla.[10] If gingival inflammation is present, recession can occur at the free gingival margin.[11] Because provisional restorations that are over-contoured and overhang the finish line of the preparation can lead to plaque build up and consequently gingival recession. So slightly convex facial and lingual contours of provisional restoration and a flat emergence profile are effective in promoting gingival health.[12]

There are several methods such as indirect technique used to fabricate provisional restorations. In practice indirect technique is commonly used. But it has some disadvantages, like it may uses more polymerization shrinkage of the prostheses that result in poor marginal adaptation, adverse reaction to oral tissue because of its residual monomer, proper curing of the material is not in presence of oral fluid, and also exothermic heat produced during polymerization causes discomfort to the patient. To evaluate the marginal accuracy of the provisional restorations fabricated by indirect technique.

Materials and methods

It was a prospective comparative type of study carried out in the Department of Prosthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University during the period of January 2006 to December 2007. The patient with fractured tooth, missing teeth or endodontically treated teeth, discolored tooth, who attended for in the out patient department of Prosthodonics, faculty of dentistry. The size of the sample was 20 patients were inserted provisional restorations fabricated by direct technique. Patients with vital tooth to be restored by fixed prosthesis, who have one or more natural teeth missing to be restored with FPD, fractured crown of teeth, healthy periontal tissue and concern with aesthetics were included. Patients with periodontally compromised, para-functional habit (Bruxism) vertical fracture and developmentally defective teeth were excluded. All relevant data of the patients was collected and recorded in specific parameters that were marginal adaptation, biocompatibility of the restoration, esthetic status of the prostheses.

Marginal Adaptation: (According to the California Dental Associations quality evaluation system). Grade l: No visible evidence of crevice along margin into which explorer will penetrate. Grade ll: Visible evidence of slight marginal discrepancy with no evidence of decay, repair can be made or is unnecessary. Grade lll: Discoloration on the margin between the restoration and the tooth structure.

Bio-compatability: (Ref.- Carranza 10th Edition. 2007;80) The index was based on the criteria of gingival redness and bleeding on probing, and was scored as: Grade l: No bleeding on probing and no plaque accumulation. Grade ll: Mild to moderate bleeding. Grade lll: Severe bleeding.

Aesthetic Status: (Ref: According to the California Dental Associations quality evaluation system. Based on color, surface, morphology of tooth.) Grade l: Exactly similar to adjacent/contralateral natural teeth. Grade ll: Slight mismatched to adjacent/contralateral natural teeth. Grade lll: Not similar to adjacent/contra lateral teeth.

Each patient was evaluated by thorough medical and dental examination herewith. Study procedure was performed between two groups, group A and Group B. The whole procedure was explained to each of the patients of the two groups. Having been assured by patient's full co-operation they were finally selected. Each patient of group A were inserted provisional restoration fabricated by Indirect technique, and each patient of group B were inserted provisional restoration fabricated by direct technique. After insertion each of them were examined after seven days, fifteen days for follow up.

Before tooth preparation, an impression is made with irreversible hydrocolloid or silicone rubber and a sectional impression tray. Then tooth preparation is carried out. After completion of the tooth preparation and bleeding control, the prepared tooth and the surrounding tissue is coated with petroleum jelly. The auto-polymerizing resin is mixed, and loaded into the impression that was taken earlier. The resin is allowed to start polymerization. When the rubbery stage of polymerization (About 2 minutes in the mouth) remove it from the mouth and excess material is removed with a scissor and again inserted into the same place. During this stage sufficient air cooling is provided with a air syringe over the area. After the polymerization is complete, the tray along the restoration is removed from the mouth and the restoration is separated from the impression and soaked in warm water for 3-5 minutes. Margins are marked with a pencil. Voids in the restoration is checked and corrected by additional material. Excess material is trimmed upto the finish line. The restoration is polished with polishing material. The final restoration is cemented with zinc oxide eugenol cement on the prepared tooth surface.

The prepared restoration is evaluated in patient's mouth for marginal adaptation, biocompatibility, and esthetic. Any defect can be corrected by adding resin. Necessary data were collected from the patients who were reported their Prosthesis condition after seven days and fifteen days. The patients were examined thoroughly to find the condition of

the prosthesis. Data were collected on the basis of some specific parameters like marginal adaptation, biocompatibility and esthetic. Collected data were recorded in a pre-designed data collection sheet. All the relevant collected data were compiled on a master chart first. After coding and editing the collected data was analyzed by using computer based programmed Statistical Package for Social Science (SPSS) for windows version 12. The result was presented in tables and figures. Chi-square test was done. The results of significance were expressed as p-value. p-value <0.05 was acceptable as statistically significant.

Results

This study shows highest number of patients was in group of 21 – 30 years. The mean age was 36.8 ±12.6 years (Table I). In 7(35%) were male and 13(65%) were female (Table II|). Marginal adaptation of provisional restoration, after 7 days 15 (75%) patients were in grade-l, 5(25%) patients in grade II. After 15 days 15 (75%) patients in grade I and 25% in grade II (Table III). According to biocompatibility of provisional restoration, after 7 days all patients were in grade-l. After 15 days, 19(95.0%) patients and 5% were in grade-ll (Table IV). According to Aesthetic status of provisional restoration, after 7 days all patients were in grade-l. After 15 days,19(95.0%) patients were in grade-l (Table V).

Table I Distribution of patients by age (n=20)

Age in years	Number	Percentage (%)	Mean±SD
21-30	9	45.0	36.8 ±12.6
31-40	3	15.0	
41-50	5	25.0	
51-60	3	15.0	
Total	20	100	

Table II Distribution of patients by sex (n=20)

Sex	Number	Percentage (%)
Male	7	35.0
Female	13	65.0

Table lll Distribution of patients according to Marginal adaptation of provisional restoration (n=20)

Grade	After 7 days		After 15 years		p value
	No	%	No	%	
Grade-l	15	75	15	75	0.100
Grade-ll	5	25	5	25	0.100
Grade lll	00	00	0	00	-

Table IV Distribution of patients according to Biocompatibility of provisional restoration (n=20)

Grade	After 7 days		After 15 years		p value
	No	%	No	%	
Grade-l	20	100	19	95	0.469
Grade-ll	0	00	1	5	0.367
Grade lll	0	00	0	00	-

Table V Distribution of patients according to Aesthetic status of provisional restoration (n=20)

Grade	After 7 days		After 15 years		p value
	No	%	No	%	
Grade-l	20	100	19	95.0	0.423
Grade-ll	0	00	1	5	0.367
Grade lll	0	0	0	00	-

Discussion

The prospective type of study was carried out to observe the advantages of indirect technique in the fabrication of provisional restoration on newly prepared tooth surface. Total 20 patients were included in this study who treated with provisional restoration fabricated by indirect technique. The main objective of this study was to the effect of indirect of fabrication of provisional restoration.

After cementation of prosthesis the patients were requested to come and maintain follow up visits after 7 days and 15 days interval and data were collected according to specific parameters of esthetic status, marginal adaptation, and biocompatibility of the prosthesis.

The age range was from 21 and 60 years. The highest number of patients was in the age of 21-30 years. In this study shows out of 20 patients, 7 were male and 13 were female and male female ratio was 1.8:1

They evaluated marginal accuracy with direct and indirect techniques. They reported that indirect fabrication provided significant improvements in marginal fit relative to direct methods, when methymeth acrylate is used. They demonstrated that, marginal fit of polymethyl methacrylate restoration could be improved by up to 70% with an indirect technique. Other reports showed similar results. They reported that the marginal fit of provisional restorations that have been polymerized undisturbed on stone cast is significantly better than that of provisional restorations that have been removed from mouth before becoming rigid.[13]

Marginal adaptation was examined in accordance to the California Dental Associations (CDA) quality evaluation system described above (Methods). According to marginal adaptation, after 7 days interval it was showed that 75.0% patients in grade-l. After 15 days between the groups of different grades, when after 7 days vs 15 days were compared, there was statistically not significant difference (p>0.05).

They reported that there was no contact of free monomer with the prepared tooth or gingiva which might causes tissue damage in indirect technique.[14]

They concluded that periodontal inflammation associated with provisional treatment could be expected to be a reversible process provided that the amount of gingival irritation is minimal and provisional treatment occurs over a short time span.[15]

The analysis of biocompatibility shown that, after 7 days 100% patients in grade-l, i.e no bleeding on probing and no plaque accumulation. After 15 days, 95.0% patients were in grade-l and 5% patients were in grade-ll. Yannikakis et al immersed provisional materials in various staining solutions upto 1 month.[9] They reported that all materials showed perceptible color changes after 1 week. After 1 month the methyl methacrylate materials exhibited the best color stability and bis acrylic material the worst.

According to esthetic status, after 7 days, all the patients of grade-l, i.e. exactly similar to adjacent/contralateral natural teeth. After 15 days, 95.0% patients were in grade-l and 5% of patients were in grade-l I.

Conclusion

The study indicates that in all aspects i.e. regarding marginal adaptation, esthetic and biocompatibility, fabrication of provisional restorations by indirect technique are preferable and safe with restorations fabricated by direct technique.

Disclosure

All the authors declared no competing interest.

References

1. Christensen, G.J. The fastest and best provisional restorations. Journal of American Dental Association. 2003;134:397.

2. Schwedhelm, E.R. Direct technique for the fabrication of acrylic provisional restorations. Journal of Contemporary Dental Practice. 2006;7:10-25.

3. Doray, P.G., Wang, X., Powers, J.M. Accelerated aging effects color stability of provisional restorative materials. Journal of Prosthetic Dentistry. 1997;6:183-188.

4. Amet, E.M., Phinney, T.L. Fixed provisional restorations for extended pre-prosthodontic treatment. Journal of oral implantology. 1995;21:201-206.

5. Moore, B.K., Wang, R.L. A comparison of resins for fabricating provisional fixed restorations. International Journal of Prosthodontics. 1989;2:173-184.

6. Ferencz, J.L. Maintaining and enhancing gingical architecture in fixed prosthodontics. Journal of Prosthetic Dentistry. 1991;65:650-657.

7. Powel, D.B., Nicholls, J.I, Youdelis, R.A. A comparison of wire and Kevlar reinforced provisional restorations. International Journal of Prosthodontics. 1994;7:81-89.

8. Larson, W.R., Dixon, D.L. Aquilino, S.A. The effect of carbon graphite fiber reinforcement on the strength of provisional crown and fixed partial denture resins. Journal of Prosthetic Dentistry. 1991;66:816-862.

9. Yannikasis, S.A., Zissis, A.J., Polyzois, G.L., Caroni, C. Color Stability of provisional resin restorative materials. Journal of Prosthetic Dentistry. 1998;80:539-553.

10. Vahidi F. The provisional restoration. Dent Clinical North America. 1987;31:363-381.

11. Weaver, R.E., Goebel, W.M. Reaction acrylic resin dental prostheses. Journal of Prosthetic Dentistry. 1980;43:138.

12. Trushkowsley, R.D. Fabrication of a fixed provisional restoration utilizing a light curing acrylic resin. Quintessence International. 1992;23:415-419.

13. Crispin, B.J., Caputo, A.A. Color stability of temporary restorative materials. Journal of Prosthetic Dentistry. 1979;42:27-33.

14. Hensten- Pettersen, A., Helgeland, K. Sensitivity of different human cell lines in the biologic evaluation of dental resin- based restorative materials. Scandinivian Journal of Dentistry. 1981:89:102.

15. Garvin, P.H., Malone, W.P., Toto, P.D, Mazur,B. Effect of self-curing acrylic resin treatment restorations on the crevicular fluid volume. Journal of Prosthetic Dentistry. 1973;47:284-289.

Original Article

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 7-10

Study on Prosthetics Rehabilitation of Patient with Exophthalmic Socket with Custom-Made Prosthesis

A.B.M Farid Uddin[1*] Mohammad Shamsuzzaman[2] Marium Choudhury[3]
Kazi Shagufa Yazdi[4] Nasima Khan[5]

Abstract

Background: *The less of an eye is an immediate trigger to the physical and emotional stress caused by personal, familiar and social reaction to the resulting facial disfigurement which can be improved by application of ocular prosthesis. This prosthesis fits over an orbital implant and under the eye-lids. Typically known as glass eye which provides no vision only aesthetics. Ocular prosthesis are made of glass, medical grade plastics, PMMA, silicone, plaster. Ocular prosthesis may be custom-made. To evaluate the custom-made ocular prosthesis for rehabilitation of patient with exophthalmic socket.*

Materials and methods: *It was a prospective comparative in vivo study carried out Department of Prosthodontics, Faculty of Dentistry, BSMMU, Dhaka from January 2009 to December 2010. 20 patients with single ex-ophthalmic socket were selected from outpatient department considering the inclusion and exclusion criteria. The patients were given custom-made ocular prosthesis. Patients were observed clinically and evaluation were done on the day of insertion, after 1 week, 2 week, 1 month, 3 months, 6 months interval.*

Results: *The results were evaluated by specific parameter as comfort, aesthetic, movement of the ocular prosthesis during facial expression. After observing the patients it was revealed that custom made ocular prosthesis was better in comfort, aesthetic and movement during facial expression.*

Conclusion: *This study revealed that custom made ocular prosthesis is better for the rehabilitation of the patient with single ex-ophthalmic socket.*

Key words

Artificial eye; Exophthalmic socket; Ocular prosthesis.

Introduction

An ocular prosthesis or an artificial eye is a craniofacial / maxilla-facial prosthesis replacement of a congenital or acquired missing of the natural eye. Maxillo-facial prosthesis are the art and science of functional anatomic and cosmetic reconstruction by the use of nonliving substitute of those region of maxillae, mandible and face-which are missing or defective.[1]

By the application of an well adapted ocular prosthesis improves patients psychological state and also increase the confidence level of the patient and the esthetic value.

1. Associate Professor (cc) of Fixed Prosthodontics Dhaka Dental College, Dhaka.
2. Associate Professor of Science of Dental Materials Bangladesh Dental College, Dhaka.
3. Associate Professor of Periodontology and Pathology Bangladesh Dental College, Dhaka.
4. Associate Professor of Paediatric Dentistry Bangladesh Dental College & Hospital, Dhaka.
5. Associate Professor of Dental Pharmacology Bangladesh Dental College, Dhaka.

*Correspondence to :
Dr. A.B.M. Farid Uddin
Cell: 01819 32 38 16
Email : drabmfariduddin@gmail.com

Date of Receipt : 18-11-2022
Date of Acceptance : 10-12-2022

This prosthesis artificially replace the balbus oculi or eyeball. Through it does not help in vision but can remove the facial asymmetry and improve facial expressions which has a very strong psychological impact on patient. Here symmetry (Size, shape, contour, color of iris, cornea are pupil) movement (Six direction) with facial expression and comfort are to be considered with priority basis.[2,3] At the same time retention, stability, reaction to surrounding tissues, tear drainage, over weight, bio-compatibility are to be considered. Ocular prosthesis should not be hazardous and fatigue to the surrounding residual tissues.[4,5]

The prosthesis eye includes oval, whitish outer shell finished to duplication the white color of the other eye round central potion is painted to look like the iris and pupil of the other eye. Ocular prosthesis are either readily available or custom made. There are various materials and methods used in the fabrication of an ocular prosthesis e.g. glass, plaster, silicon, plastic shell, poly methyl meth Acryl-ate PMMA.[5] Before World War-II, however all ocular prosthesis were made of glass and supplied in standard sizes and color that could not be altered. In 1944 investigator at the Naval graduate dental school developed a custom fitted methyl meth acrylate resin ocular prosthesis. Since every socket differs in size and shape- so each patient demands individually designed prosthesis made from an impression of the socket for better aesthetic and comfort.[6] This study describes effects (Aesthetic, comfort wellbeing of individual) of custom made ocular prosthesis.

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023; 7-10

Materials and methods

It was a prospective comparative in vivo study carried out Department of Prosthodontics, Faculty of Dentistry, BSMMU, Dhaka from January 2009 to December 2010. Eligible subject were those who had single anophthalmic socket through the surgical procedure of evisceration and enucleation. Total 20 patients were given custom-made ocular prosthesis. Patients were observed clinically and evaluation were done on the day of insertion, after 1 week, 2 week, 1 month, 3 months, 6 months interval. After period of time usually 6-8 weeks that needed for the healing and reduction of the tissue swelling, then the patient was ready for prosthesis. Each of the patients was evaluated by a through medical, dental & ocular history as well as clinical examination, diagnostic and radiographic examination as per history sheet. Since every socket differs in size and shape, it is obvious that an individually designed prosthesis, made from an impression of the socket, is needed to utilize the full movement potential of an implant and also to provide maximum comfort and restore full physiologic function to the accessory organ of the eye. Data were collected pre-designed data collection sheet. Data were analysis using computer based programme Statistical Package for Social Science (SPPS) for windows version 16. The result were presented in table and t-test was done to find out the p value. p value (<0.05) was consider as significant.

Results

Table I Distribution of patients in term of comfort at different follow-up visit

Comfort index	Frequency	Percentage (%)
Day of insertion		
Grade I : Good	4	20.0
Grade II : Fair	10	50.0
Grade III: Poor	6	30.0
After 1 week		
Grade I : Good	12	60.0
Grade II : Fair	8	40.0
Grade III: Poor	0	00
After 2 weeks		
Grade I : Good	18	90.0
Grade II : Fair	2	10.0
Grade III: Poor	0	00
After 1 month		
Grade I : Good	18	90.0
Grade II : Fair	2	10.0
Grade III: Poor	0	00
After 3 months		
Grade I : Good	18	90.0
Grade II : Fair	2	10.0
Grade III: Poor	0	00
After 6 months		
Grade I : Good	18	90.0
Grade II : Fair	2	10.0
Grade III: Poor	0	00

Grade I : Good-rarely cause discomfort.

Grade II: Fair-occasional soreness but still able to wear the prosthesis.

Grade III: Poor-continuous soreness or unable to wear the prosthesis.

Table II Distribution of patients in term of aesthetic at different follow-up visit

Aesthetic index	Frequency	Percentage (%)
Day of insertion		
Grade I : Good	6	30.0
Grade II : Fair	12	60.0
Grade III: Poor	2	10.0
After 1 week		
Grade I : Good	6	30.0
Grade II : Fair	12	60.0
Grade III: Poor	2	10.0
After 2 weeks		
Grade I : Good	6	30.0
Grade II : Fair	14	70.0
Grade III: Poor	0	00
After 1 month		
Grade I : Good	11	55.0
Grade II : Fair	9	45.0
Grade III: Poor	2	10.0
After 3 months		
Grade I : Good	14	70.0
Grade II : Fair	6	30.0
Grade III: Poor	0	00
After 6 months		
Grade I : Good	18	90.0
Grade II : Fair	2	10.0
Grade III: Poor	0	00

Grade I : Good-rarely cause discomfort.

Grade II: Fair-occasional soreness but still able to wear the prosthesis.

Grade III: Poor-continuous soreness or unable to wear the prosthesis.

Table III Distribution of patients in term of ocular prosthesis during facial expression at different follow-up visit

Facial index	Frequency	Percentage (%)
Day of insertion		
GI (0): Standard movement	0	00
Grade II(-1): Mild restriction	6	30.0
Grade III(-2): Moderate restriction	8	40.0
Grade IV(-3): Severe restriction	6	30.0
Grade V(-4): Full restriction	0	00
After 1 week		
GI (0): Standard movement	0	00
Grade II(-1): Mild restriction	8	40.0
Grade III(-2): Moderate restriction	6	30.0
Grade IV(-3): Severe restriction	6	30.0
Grade V(-4): Full restriction	0	00
After 2 weeks		
GI (0): Standard movement	0	00
Grade II(-1): Mild restriction	10	50.0
Grade III(-2): Moderate restriction	4	20.0
Grade IV(-3): Severe restriction	6	30.0
Grade V(-4): Full restriction	0	00
After 1 month		
GI (0): Standard movement	2	10.0
Grade II(-1): Mild restriction	11	55.0
Grade III(-2): Moderate restriction	5	25.0
Grade IV(-3): Severe restriction	2	10.0
Grade V(-4): Full restriction	0	00
After 3 month		
GI (0): Standard movement	3	15.0
Grade II(-1): Mild restriction	12	60.0
Grade III(-2): Moderate restriction	3	15.0
Grade IV(-3): Severe restriction	2	10.0
Grade V(-4): Full restriction	0	00
After 6 month		
GI (0): Standard movement	3	15.0
Grade II(-1): Mild restriction	13	65.0
Grade III(-2): Moderate restriction	2	10.0
Grade IV(-3): Severe restriction	2	10.0
Grade V(-4): Full restriction	0	00

Discussion

The custom made ocular prosthesis gives better continuing, color matching, co-ordinated momement in comparison to pre-fabricated ocular prosthesis. New method, technique and material are invented to advance the success of prosthesis. Through these revolution modern method has provided best service to humanity by improving life style. For restoration of enucleated eye, many techniques or methods were practiced since many years and gradually here is upgradation of fabrication of ocular prosthesis has happened.

Prosthesis rehabilitation of a patient is greatly enhanced by placement of an implant in the orbit. Now a days during enucleation and evisceration of orbital socket- an implant (Heterogenous/autograft-demofat) is placed and secured within the socket by suturing different muscles. It definitely improves the motility of prosthesis and prevent socket contraction and facial disfiguration. After healing (6-8 weeks) of anophthalmic socket prosthesis either ready-made or custom-made were fitted.

In this study we have emphasized on the comfort, esthetic and movement. The close adaptation of custom made ocular prosthesis, the tissue bed provides better comfort as it is made according to the contours of the tissue.

In this study patients with single anophtalmic socket were selected considering the criteria (Inclusion and exclusion). Accordingly, patients were treated with custom-made prosthesis. Timely data were collected as per the schedule. Finally the result and outcome measures were statistically analyzed and presented from different angle.

Regarding comfort of the ocular prosthesis it could be said that first experience of wearing ocular prosthesis might cause tenderness from the unaccustomed use.[7] In our study with custom-made ocular prosthesis show cases comfortable our of 20 patients on the day of insertion. During follow-up stage- more number of patients showed good comfort. It can be said that comfort rate increase in uprising manner visit by visit. At the same time poor grade were declining and zero in number at the last.

Considering the above uprising, declination, slow motion, etc. It can be said that the custom-made ocular prosthesis is better one in the ground of comfort. Comfort of the ocular prosthesis is related to excessive secretion, irritation, persistence aching in the socket- which are caused by following agents- winds, head cold, allergies, extreme temperature, hand contamination, local inflammation of the socket bed, sharpness, roughness, scratches, over size of prosthesis. Correction of the above mentioned agents will improve the comfort level.

Regarding the movement of the ocular prosthesis during facial expression is important aspect of the overall cosmetic appearance which produce life like eye similar in all aspect to the normal fellow eye. Several theories and methods are invented and applied such as using integrating prosthetic material, pegging the implant, covering the implant with scleral tissue, suturing the eye muscles directly to the prosthetic implant. Movement is transmitted through the surface tension at the conjunctival-prosthesis interface and movement of the fornices. Therefore any movement of the conjunctival fornices will cause a similar movement of the artificial eye whereas lack of movement of the fornices will restrict it's motility.[8]

In our study custom-made ocular prosthesis showed no standard movement (Grade 1) on the day of insertion after 1st week and after 2nd week. Then on following visit, more number of patient showed grade I and II level movement. Later on grade I and II score increases gradually visit by visit.

Conclusion

The rehabilitation of patient with eye loss is challenging because of the combination of the deformation. So, in this study it was focused on patients physical and mental wellbeing in addition to providing comfort better esthetic and movement. This study shows custom-made ocular prosthesis provided good result in term of comfort index, aesthetic index and facial index patient acceptance and satisfaction. Custom made ocular prosthesis is highly recommended in rehabilitation of patient with ex-ophthalmic socket.

Disclosure

All the authors declared no competing interest.

References

1. Nallaswamy D. Textbook of prosthodontics, 1st ed. Elsevier Health Sciences. 2003;684-709.

2. More DJ, Ostrowski JS, King LM. A quasi-integrated custom ocular prosthesis. J Prosthet Dent. 1975;32(4): 439-442.

3. Taicher S, Steinberg HM, Sela TM. Modified stock-eye ocular prosthesis. The Journal of Prosthetic Dentistry. 1985;54(1):95-98.

4. Shifman A, Levin AC. Prosthetic restoration of orbital defects. The Journal of Prosthetic Dentistry. 1979;42(5):543-546.

5. DaBreo EL, Schuller DE. Surgical and prosthetic consideration in the management of orbital tumours. The Journal of Prosthetic Dentistry. 1992;67:106-109.

6. Bartlett SO, Moore DJ. Ocular-prosthesis: a physiologic system. J Prosthet Den. 1973;4:450-458.

7. Harwin F. Comfort of the prosthesis, center for ocular prosthesis LLC. 1996.

8. Colen TP, Paridaens DA, Lemij HG, Mourits MP, van Den Bosch WA. Comparison of artificial eye amplitudes withy acrylic and hydroxyapatite spherical encleation implants. Ophthalmology. 2000;107(10):1889-1894.

Original Article

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 11-15

Correlation between HbA1c and Different Lipid Parameters and the Potential of HbA1c as a Predictor of Dyslipidemia in Bangladeshi Type 2 Diabetic Patient in Jashore City

Marufa Akhter[1] Md. Kamal Hossain[2] Abu Hena Mostafa Kamal[3] Hasina Nasreen[4]

Abstract

Background: *Dyslipidemia is a common feature of diabetes mellitus, which is also a major risk factor for atherosclerotic cardiovascular disease and premature death in both type 1 and Type 2 Diabetes Mellitus (T2DM). The aim of this study was to find out the correlation between HbA1c and different lipid parameters in T2DM subjects in Jashore, Bangladesh. We also investigated the potentials of HbA1c as a predictor of dyslipidemia in T2DM subjects.*

Materials and methods: *This was an observational study of cross sectional design conducted among 86 T2DM Bangladeshi subjects in Jashore city. Blood samples were tested for glycated Hemoglobin (HbA1c) Fasting Blood Sugar (FBS) and lipid profile parameters. Test results were analyzed using IBM SPSS Statistics 25 version.*

Results: *There was significant moderately strong positive correlation between HbA1c and Total Serum Cholesterol (TC) Low Density Lipoprotein Cholesterol (LDL-C) Triglyceride (TG) and LDL-C/HDL-C ratio. Correlation between HbA1c and High Density Lipoprotein Cholesterol (HDL-C) was negative and weak (r=-0.298) but statistically significant. We did not find any correlation between HbA1c and FBS in our study (r = 0.058, p = 0.594). Linear regression analysis showed HbA1c as a predictor of hypercholesterolemia (p = 0.000, R^2 = 0.467), high LDL-C (p = 0.000, R^2 = 0.445), low HDL-C (p = 0.006, R^2 = 0.086), high TG (p = 0.000, R^2 = 0.292), and high LDL-C/HDL-C ratio (p = 0.000, R^2 = 0.446).*

Conclusion: *Early prediction of dyslipidemia using HbA1c and active intervention can results in better clinical outcome and reduction in premature death in T2DM patients.*

Key words

Dyslipidemia; HbA1c; Type 2 diabetes mellitus; Lipid profile.

Introduction

Cardiovascular diseases, cancers, chronic respiratory diseases and diabetes mellitus, these four big killers account for the 63% of all deaths globally and 86% deaths in low and middle-income countries like Bangladesh.[1] International Diabetes Federation (IDF) estimated 14.2% prevalence rete (Population aged 20-79 years) and 74.2 million clinical cases of diabetes in Bangladesh which is alarming whereas the overall global prevalence rate is much lower in many region. It was also estimated that in 2021 around 75,000 diabetes related death occurred in Bangladsh.[2] Type 2 diabetes mellitus (T2DM) accounts for the vast majority of diabetes cases. Diabetes can lead to complications in many parts of the body and increase the overall risk of premature death. Complications of T2DM include coronary artery disease, cerebrovascular disease, renal failure, leg amputation, vision loss and neuropathies.[3] Major deaths directly attributed to T2DM is due to cardiovascular complications.[4] Chronic hyperglycemia is associated with the development of microvascular disease and caries an increased risk for cardiovascular disease in persons with diabetes.[5] Dyslipidemia is common in diabetes and there is an association between atherosclerotic cardiovascular disease and Dyslipidemia in both type 1 and type 2 diabetes. It is also evident that good glycemic control reduce serum cholesterol and triglyceride through decreased circulating Very-Low-Density Lipoprotein (VLDL) and by increased catabolism of low density lipoprotein (LDL).[6]

The American Diabetes Association (ADA) adopted the recommendation of International Expert Committee (2009) to use HbA1c to diagnose diabetes mellitus with a threshold > 6.5%. Although the ideal HbA1c goal for diabetic patients is as low as < 6% without causing significant hypoglycemia, the ADA's recommended goal for HbA1c is < 7% in all patients with diabetes mellitus.[7,8] The same HbA1c level is recommended for prevention of cardiovascular complications in diabetic patients.[9,10] The primary objective of our study was to assess the lipid profile of T2DM patients with good (Hb1Ac < 7%) and poor (HbA1c ≥7%) glycemic control. We tried to find out the correlation between HbA1c and different lipid parameters and the possibilities of using HbA1c level as a predictor of dyslipidemias among T2DM subjects in Jashore city.

1. Associate Professor of Biochemistry
Ad-din Sakina Women's Medical College, Jashore.
2. Associate Professor of Biochemistry
Chattagram Maa-O-Shishu Hospital Medical College, Chattogram.
3. Professor of Biochemistry
Army Medical College, Jashore.
4. Registrar
Chittagong Medical University, Chattogram.

*Correspondence to :
Dr. Marufa Akhter
Cell: 01715 21 99 63
Email : drmarufabio@gmail.com

Date of Receipt : 16-11-2022
Date of Acceptance : 12-12-2022

Materials and methods

This study was an observational cross sectional study carried out on a total 86 T2DM patients attended in the Outpatient Department of Ad-din Sakina Women's Medical College Hospital, Jashore, Bangladesh over a period of 9 months, from 1st January 2022 to 30th September 2022. Voluntarily agreed adult subjects with age ranging from 35 to 78 years were included after taking informed consent.

Blood from study subjects was drawn after an overnight fasting of 8-14 hours. Blood samples were collected by venipuncture to assess the biochemical tests including fasting blood sugar (FBS), HbA1c, serum total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C) and triglyceride (TG). Biochemical test were done using standard procedure.

Data were expressed as mean ± standard deviation (SD). Value of HbA1c was given as percentage of total hemoglobin and values of all other parameters were given in mg/dl. Comparison of mean values between two groups (subjects with HbA1c < 7% and 7%) were tested using either Student's t-test (unpaired) or Mann-Whitney 'U' Test wherever appropriate. Chai Square Test and Fisher's Exact Test was done for categorical data.

Results

Among total 86 participants, 50 (58.1%) subjects had their HbA1c < 7% and 36 (41.9%) had their HbA1c ≥7%. Frequency of male and female participants were, 58.0% male and 42.0% female. Among all T2DM participant 44.2% male and 38.2% female had poor glycemic control assessed by HbA1c.Among all study subjects, we found high level of TC, LDL-C, TG and LDL-C/HDL-C ratio in 38.4%, 39.5%, 51.2% and 52.2% subjects respectively (Table I).

Table I Baseline frequency table for male and female T2DM subjects

	All T2DM subjects	Male T2DM	Female T2DM	p value (sig.)
HbA1c ≥7%	41.9%	44.2%	38.2%	0.582
High TC (≥200 mg/dl)	38.4%	38.5%	38.2%	0.983
High LDL (≥130 mg/dl)	39.5%	42.3%	35.3%	0.515
Low HDL (≤40 mg/dl)	54.7%	53.8%	55.9%	0.853
High TG (≥150 mg/l)	51.2%	42.3%	64.7%	0.042*
High LDL/HDL (3)	52.3%	55.8%	47.1%	0.429

Type 2 Diabetes Mellitus : T2DM, HbA1c : Glycated Hemoglobin, TC: Total Cholesterol, LDL-C: Low Density Lipoprotein Cholesterol, HDL-C: High Density Lipoprotein Cholesterol, TG: Triglyceride.
*statistically significant.

The clinical characteristics of T2DM study subjects according to their glycemic control (Assessed by HbA1c) are shown in Table II.

Table II Baseline characteristics of subjects according to HBA1c level

	Subjects with HbA1c < 7%	Subjects with HbA1c ≥ 7%	p value (sig.)
Age in years	52.1 ± 10.0	53.4 ± 10.8	0.575
WHR	0.950 ± 0.07	0.949 ± 0.07	0.923
BMI	26.36 ± 5.10	25.89 ± 5.03	0.670
FBS (mg/dl)	185.04 ± 53.18	180.05 ± 58.13	0.685
HBA1c (%)	5.80 ± 0.69	8.09 ± 1.45	0.000*
TC (mg/dl)	179.51 ± 49.08	227.68 ± 87.06	0.003*
LDL-C (mg/dl)	111.76 ± 44.57	157.33 ± 80.26	0.000*
HDL-C (mg/dl)	43.29 ± 12.57	35.81 ± 6.92	0.002*
TG (mg/dl)	122.29 ± 71.73	172.62 ± 69.73	0.001*
LDL-C/HDL-C ratio	2.796 ± 1.477	4.683 ± 2.847	0.000*

Results were expressed as mean ± Slandered Deviation (SD). Unpaired Student's t test and Mann-Whitney U test were performed to compare between groups at 5% significance level. WHR, waist hip ratio, BMI: Body Mass Index, FBS: Fasting Blood Sugar, HbA1c: Glycated Hemoglobin, TC: Total Cholesterol, LDL-C: Low Density Lipoprotein Cholesterol, HDL-C: High Density Lipoprotein Cholesterol, TG: Triglyceride.
*statistically significant.

Unpaired Student's t test and Mann-Whitney U test were performed to compare between groups (Subjects with HbA1c< 7%vs HbA1c 7%) at 5% significance level. In our study the mean of serum TC, LDL-C, HDL-C, TG and LDL-C/HDL-C ratio was fairly high among T2DM subjects with HbA1c level ≥7% when compared with T2DM subjects with HbA1c level < 7%, pvalues were 0.003, 0.000 0.002, 0.001 and 0.000 respectively (Table II). Figure 1 demonstrates bar chart of lipid profile comprising between subjects with good (HbA1c < 7%) and poor (HbA1c ≥7%) glycemic control.

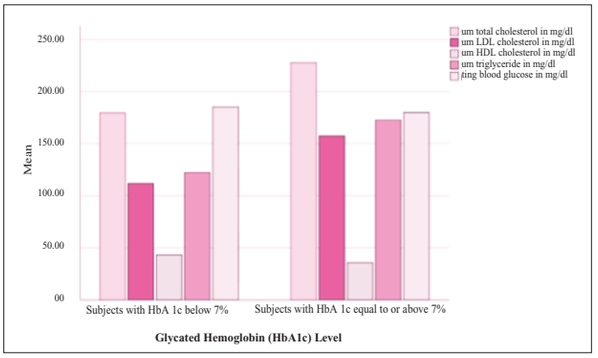

Figure 1 Bar chart showing comparison of mean values of serum TC, LDC, HDL-C, TG and FBS between study subjects with HbA1c < 7% and HbA1c ≥ 7%

Table III shows p values of Chi-square test and Fisher's Exact test wherever appropriate. We found high TC level (TC ≥200 mg/dl), high LDL-C level (LDL-C ≥ 130 mg/dl), low HDL-C level (HDL-C ≤ 40 mg/dl) high TG level (TG ≥150 mg/dl) and high LDL-C/HDL-C ratio level (LDL-C/HDL-C ratio ≥3) in 52.8%, 61.1%, 69.4%, 69.4% and 72.2% in subjects with HbA1c ≥7% (Table III).

Table III Frequency (%) table of lipid abnormalities, Chi-square test and odds ratio

T2DM subjects with	High TC level	High LDL-C level	Low HDL-C level	High TG level	LDL-C/ HDL-C ratio
	≥ 200md/dl	≥ 130mg/dl	≤ 40mg/dl	≥ 150mg/dl	≥3
HBA1c < 7%	28.0%	24.0%	44.0%	38.0%	38.0%
HBA1c ≥ 7%	52.8%	61.1%	69.4%	69.4%	72.2%
p-value (Chi^2 Tests)	0.020*	0.001*	0.019*	0.004*	0.002*
OR (At 95% CI)	2.874	4.976	2.893	3.708	4.242

HbA1c, Glycated Hemoglobin, TC: Total Cholesterol, LDL-C: Low Density Lipoprotein Cholesterol, HDL-C: High Density Lipoprotein Cholesterol, TG: Triglyceride, OR: Odds Ratio, CI: Confidence Interval. *statistically significant.

Significant positive correlation was observed in our study between HbA1c and serum TC, LDL-C, TG and LDL-C/HDL-C ratio. The Pearson's correlation coefficient (r) of serum TC, LDL-C, TG and LDL-C/HDL-C ratio with HbA1c were, 0.684, 0.667, 0.548 and 0.670, all ofwhich were strongly significant ($p< 0.05$). HDL-C showed negative correlation with HbA1c ($r = -0.298$). Although the negative correlation of HDL-C with HbA1c was weak ($r < \pm 0.3$), it was also significant statistically (Figure 2 and Table IV).

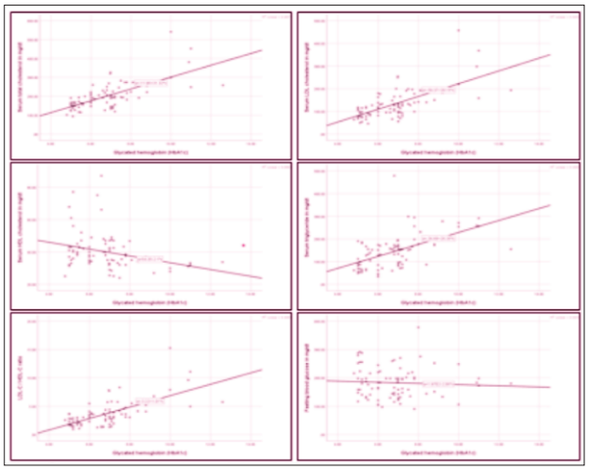

Figure 2 Scatter diagrams showing correlations of glycated hemoglobin (HbA1c) with serum total cholesterol, LDL cholesterol, HDL cholesterol, trlglycerldc, LDL cholesterol / HDL cholesterol ratio and fasting blood sugar

Table IV Correlation studies between HbA1c and lipid profile variables

		Dependent variables				
		Total Cholesterol	Serum LDL Cholesterol	Serum HDL Cholesterol	Serum Triglyceride	LDL/HDL Ratio
HBA1c	Pearson's correlation coefficient (r)	0.684	0.667	- 0.298	0.548	0.670
	Coefficient of determination (r^2)	0.467	0.445	0.086	0.300	0.446
	Sig. (p value) of the F test for regression analysis	0.000*	0.000*	0.006*	0.000*	0.000*

HbA1c : Glycated Hemoglobin, TC: Total Cholesterol, LDL: Low Density Lipoprotein, HDL: High Density Lipoprotein, TG: Triglyceride.
*statistically significant.

Discussion

This study was conducted in a peripheral city of Bangladesh, where scarcity of data compel the local physicians to rely on medical data from abroad. The heterogeneity in pathophysiology as well as risk factors of diabetes depending on racial, environmental, demographic, socioeconomic, and cultural factors are well established and the importance of data from indigenous population is undoubtedly important.[11]

In our study mean age of participants was 52.64 years. Among randomly selected subjects with T2DM, 52% were male and 48% were female, which shows no significant difference statistically in frequency of T2DM considering gender issue. Other studies showing equal prevalence of T2DM among men and women also supported the fact.[12,13] In the present female T2DM subjects had higher predilection of hypertriglyceridemia when compared with male T2DM subjects (64.7% vs 42.3%). Although other components of lipid profile showed no significant difference conferring to subject's gender. The differences in lipid profile among men and women may be due to the effects of sex hormone on body fat distribution leading to some alteration in lipoproteins.[14] In this study among all T2DM patients hypercholesterolemia was found in 38.4%, high LDL-C was found in 39.5%, low HDL-C was found in 54.7%, high TG found in 51.2% and high LDL-C/HDL-C ratio was found in 52.3%. These findings were almost similar to the findings of the study conducted by Arshad Husain et al. except that they found much higher percentages of subjects with high level of TC and LDL-C in their study.[15]

In the current study, significantly higher mean values in serum levels of TC, LDL-C, TG, LDL-C/HDL-C ratio and lower mean value in serum HDL-C were noted in patients with T2DM, which are well known risk factors for cardiovascular diseases. We observe similar pattern of dyslipidemias in other studies.[16] Considering chronic hyperglycemia in our study subjects, which was accessed by HbA1c in this study, we noticed much higher mean of TC, LDL-C, TG and LDL-C/HDL-C values and lower HDL-C value in subjects with poor glycemic control (HbA1c 7%) when compared with good glycemic control (HbA1c < 7%) subjects. This finding is in agreement with the previous studies.[17,18] Insulin resistance might play the most important role in diabetic dyslipidemia and each lipidabnormality increase the risk of atherosclerotic cardiovascular complication.[19] In our study we observed fairly high prevalence of hyperlipidemia (52.8%), high LDL-C (61.1%), hypertriglyceridemia (69.4%), high LDL-C/HDL-C ratio (72.0%) and low HDL-C (69.4%) in T2DM individuals with chronic hyperglycemia (HbA1c ≥ 7%)

when compared with T2DM individuals with good glycemic control (HbA1c < 7%). We observe similar study outcome in studies carried out by Ram VinoMahato et al and others.[20-22]

The study revealed highly significant moderate to strong positive correlation between HbA1c and TC, LDL-C, TG and LDL-C/HDL-C ratio. The negative correlation between HbA1c and HDL-C was weak but statistically significant in our study. These findings were in agreement with various previous studies.[23,24] The interesting finding in our study was that HbA1c was proved to be a predictor of all types of dyslipidemias by linear regression analysis. This unique potential of HbA1c in predicting lipid abnormalities as well as assessing retrospective glycemic control in diabetic patients is also observed in other studies.[25] In our study we did not find any significant correlation between HbA1c and FBS. This contradict with most of the study findings carried out by others.[26-28]

In our present study we found HbA1c as a useful biomarker for predicting dyslipidemias in T2DM subjects which may reduce atherosclerotic cardiovascular risk and premature death by early intervention. United Kingdom Prospective Diabetes Study (UKPDS35) showed that 1% reduction in HbA1c in T2DM subjects there is 21% reduction in the risk of diabetes related death and a 14% decrease in the incidence of myocardial infarction.[29] It is true that, some remote places in Bangladesh have limitation in performing HbA1c test. Transportingdried blood spot samples for analysis of HbA1c may be an alternative.[30]

Conclusion

There is significant correlation between HbA1c and different components of circulating lipid and HbA1c can be predictor of dyslipidemias. Significant difference in lipid abnormalities were observed between T2DM individuals with good and poorly controlled glycaemia assessed by HbA1c (<7% vs ≥7%). Implementing HbA1c for early detection of lipid abnormalities and proper management might make good clinical outcome.

Acknowledgement

The authors thank all the participants and laboratory team members for their excellent cooperation and helping attitude for conduction of the study.

Disclosure

All the authors declared no competing interest.

References

1. Global action plan for the prevention and control of non-communicable diseases 2013-2020. World Health Organization. 2013.

2. International Diabetes Federation. IDF Diabetes Atlas 2021 – 10th edition.

3. WHO: Diabetes fact sheet (16 September, 2022). https://www.who.int/news-room/fact-sheets/detail/diabetes.

4. Meiying Zhu, Jiang Li, Zhiyuan Li et al. R Mortality rates and the causes of death related to diabetes mellitus in Shanghai Songjiang District: An 11-year retrospective analysis of death certificates. BMC Endocrine Disorders. 2015;15:45.

5. Elizabeth Selvin, SpyridonMarinopoulos, Gail Berkenblit et al. Meta-Analysis: Glycosylated Hemoglobin and Cardiovascular Disease in Diabetes Mellitus. Ann Intern Med. 2004 ;141(6):421-431.

6. Jonathan D, Schofield, Yifen Liu et al. Diabetes Dyslipidemia. Diabetes Ther. 2016;7(2):203-219.

7. International Expert Committee. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. Diabetes Care. 2009;32(7):1327-1334.

8. American Diabetes Association. Standards of medical care in diabetes--2010. Diabetes Care. 2010;33(Suppl 1):S11-61.

9. Buse JB, Ginsberg HN, Bakris GL et al. Primary prevention of cardiovascular diseases in people with diabetes mellitus: a scientific statement from the American Heart Association and the American Diabetes Association. Diabetes Care. 2007;30(1):162-172.

10. S M Grundy, D Becker, L T Clark, et al. Detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). Circulation. 2002;106(25):3143-3421.

11. Roglic G.WHO Global report on diabetes: A summary. Int J Non-Commun Dis. 2016;1(1):3-8.

12. Idogun ES, Unuigbe EI, Ogunuro PS, Akinola OT, Famodu AA. Assessment of serum lipids in Nigerians with type-2 diabetes mellitus complications. Pak J Med Sci 2007;23(5):708-712.

13. Dowse GK, Gareeboo H et al. High prevalence of NIDDM and impaired glucose tolerance in Indian, Creole, and Chinese Mauritians. Mauritius Noncommunicable Disease Study Group. Diabetes. 1990;39(3):390-396.

14. Khaw KT, Wareham N, Bingham S et al. Association of hemoglobin A1c with cardiovascular disease and mortality in adults: The European prospective investigation into cancer in Norfolk. Ann Intern Med. 2004;141(6):413-420.

15. Hussain A, Ali I, Ijaz M, Rahim A. Correlation between hemoglobin A1c and serum lipid profile in Afghani patients with type 2 diabetes: Hemoglobin A1c prognosticates dyslipidemia. TherAdvEndocrinolMetab. 2017;8(4):51-57.

16. Dixit AK, Dey R, Suresh A, Chaudhuri S, Panda AK, Mitra A, Hazra J. The prevalence of dyslipidemia in patients with diabetes mellitus of ayurveda Hospital. J Diabetes MetabDisord. 2014;13:58.

17. American Diabetes Association Management of Dyslipidemia in Adults With Diabetes. Diabetes Care. 2003;26 (suppl_1):s83-s86.

18. Kishore P, Kim SH, Crandall JP. Glycemic control and cardiovascular disease: what's a doctor to do? CurrDiab Rep. 2012;12(3):255-264.

19. Ronald M. Krauss. Lipids and Lipoproteins in Patients With Type 2 Diabetes. Diabetes Care. 2004;27(6):1496–1504.

20. Ram V, Prajwal G, PramodPsd. Raut et al. Association between glycaemic control and serum lipid profile in type 2diabetic patients: Glycated haemoglobin as a dual biomarker. Biomedical Research. 2011;22(3):375-380.

21. Howard BV. Lipoprotein metabolism in diabetes mellitus. J Lipid Res. 1987;28(6):613-628.

22. Taskinen MR, Kahri J, Koivisto V et al. Metabolism of HDL apolipoprotein A-I and A-II in type 1 (Insulin-dependent) diabetes mellitus. Diabetologia. 1992;35(4):347-356.

23. Erciyas F, Taneli F, Arslan B et al. Glycemic control, oxidative stress, and lipid profile in children with type 1 diabetes mellitus. Arch Med Res. 2004;35(2):134-140.

24. Ohta T, Nishiyama S, Nakamura T et al. Predominance of large low density lipoprotein particles and lower fractional esterification rate of cholesterol in high density lipoprotein in children with insulin-dependent diabetes mellitus. Eur J Pediatr. 1998;157(4):276-281.

25. Shariq I. Sherwani, Haseeb A. Khan, AishahEkhzaimy et al. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. Biomarker Insight. 2016; 11. https://doi.org/10.4137/BMI.S38440

26. Ito C, Maeda R, Ishida S et al. Correlation among fasting plasma glucose, two-hour plasma glucose levels in OGTT and HbA1c. Diabetes Res ClinPract. 2000;50(3):225-230.

27. Ko GT, Chan JC, Woo J et al. Glycated haemoglobin and cardiovascular risk factors in Chinese subjects with normal glucose tolerance. Diabet Med. 1998;15(7):573-578.

28. Rosediani M, Azidah AK, Mafauzy M. Correlation between fasting plasma glucose, post prandial glucose and glycated haemoglobin and fructosamine. Med J Malaysia. 2006;61:67-71.

29. Stratton IM, Adler AI, Neil HA et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. BMJ. 2000;321(7258):405-412.

30. Jones TG, Warber KD, Roberts BD. Analysis of hemoglobin A1c from dried blood spot samples with the Tina-quantR II immunoturbidimetric method. J Diabetes Sci Technol. 2010;4(2):244-249.

Original Article

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023; 16-18

Ameloblastoma: A Radiographic and Histopathologic Analysis

Md. Abdul Hakim[1*] Abu Sayem Muhammad Jakee Azam Sohan[2] Shahanaz Akter Bijou[3]
Mausumi Iqbal[4] Md. Seid Iqbal[5] Jannatul Ferdous[6]

Abstract

Background: *Ameloblastoma is a rare disorder of the jaw involving abnormal Issue growth. The resulting tumors or cysts are usually not malignat but the tissue growth may be aggresive in the involved area. The purpose of this study was to compare the radiological and histopathological features of 35 intraosseous ameloblastomas.*

Materials and methods: *It is a cross sectional study. Total 35 patients with ameloblastoma were included in the study and treated at Oral and Maxillofacial Surgery Department, Rajshahi Medical College Hospital during the period from July 2018 to June 2022. Data with respect to the patients age, sex, tumour locations and histologic types as well as radiological findings were analyzed.*

Results: *The patients' ages at biopsy ranged from 11 to 70 years (Mean, 30.4 years). 19 (54.9%) of the 35 subjects were males, and 16 (45.1%) were females. 33 (94.28%) of the 35 ameloblastomas were located in the mandible. Radiographically, 22 (62.85%) of the 35 tumours were unilocular with a well-demarcated border. Of the remaining 13 cases, 10 were multilocular, 3 were of soap-bubble shape. The most common histologic pattern was plexiform, rather than follicular or acanthomatous. 16 cases of ameloblastoma had developed in a cyst.*

Conclusion: *Histopathological and Radiological examinations are an important tools for the diagnosis of oral lesions of various types, especially those are involve bone and soft tissues. All such lesions should be biopsied and an accurate histologic diagnosis should be obtained before definitive treatment is performed.*

Key words

Ameloblastoma; Biopsy; Histopathological type; Radiographic features.

Introduction

Ameloblastomas are common benign oral tumours. Their name implies a resemblance to cells of the enamel-forming organ. The general agreement that ameloblastomas are odontogenic in origin occurs largely on the basis of the histologic similarities of the tumour and the developing enamel organ.[1-5] Ameloblastomas in young people (ie, those 19 years old and younger) are thought to be rare. They account for approximately 10% to 15% of all reported cases of ameloblastoma.[6,7] Kahn is generally credited with proposing the theory that an ameloblastoma arises in a dentigerous cyst.[8] Numerous authors have confirmed this, describing their findings in case reports, in addition, several articles have discussed possible pathogenic mechanisms.[9-11] Several causative factors have been proposed, including

i) Nonspecific irritating factors such as extraction, caries, trauma, infection, inflammation, or tooth eruption

ii) Nutritional deficit disorders

iii) Viral pathogenesis.[12-13]

The plexiform-unicystic pattern is less aggressive and has a significantly lower recurrence rate. Robinson and Martinez studied 10 patients with unicystic ameloblastoma to define more precisely the biological behavior of ameloblastomas.[14] Numerous cases of ameloblastoma have been reported in the literature. However, only a few articles discuss ameloblastomas in children and adolescents, and few closely examine their nature and pathogenesis. In this study, we analyzed radiologic and histopathologic features of intraosseous ameloblastomas in 35 patients. We also compared these features with the biological behavior of the tumours.

1. Assistant Professor of Oral & Maxillofacial Surgery
Dental Unit, Rajshahi Medical College, Rajshahi.
2. Assistant Professor of Prosthodontics
Dental Unit, Rajshahi Medical College, Rajshahi.
3. Assistant Professor of Oral & Maxillofacial Surgery
Dental Unit, Kumudini Women's Medical College.
4. Assistant Professor of Oral & Maxillofacial Surgery
Dental Unit, Dhaka Community Medical College Hospital.
5. Lecturer of Orthodontics
Shaheed Suhrawardy Medical College, Dhaka.
6. Dental Surgeon
Islami Bank Medical College Hospital, Rajshahi.

*Correspondence to :
Dr. Md. Abdul Hakim
Cell: 01712 53 48 24
Email : dr.hakim25@gmail.com

Date of Receipt : 10-11-2022
Date of Acceptance : 18-12-2022

Materials and methods

It is a cross sectional study. 35 patients with ameloblastoma were treated at Oral & Maxillofacial Surgery Department of Rajshahi Medical College Hospital between July 2018 and June 2022. All histological and radiological information with respect to age, sex and location were verified. Histology slides from each case were reviewed and classified according to histologic patterns.

Results

The study group consisted of 19 males and 16 females with a mean age of 30 years (Median, 40.5 years; range, 11-70 years, Figure I and II). In 33 cases (94.28%) the tumours were located in the mandible and in 8 cases (22.5%) the tumours were cystic in origin. Of the 33 mandibular lesions 21(60%) cases were located primarily in the mandible body (Figure III).

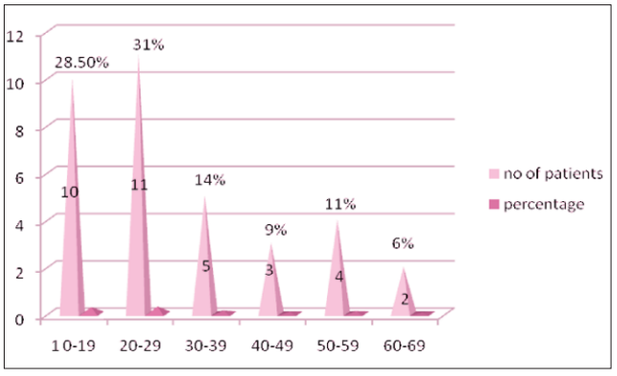

Figure I Age distribution of ameloblastoma

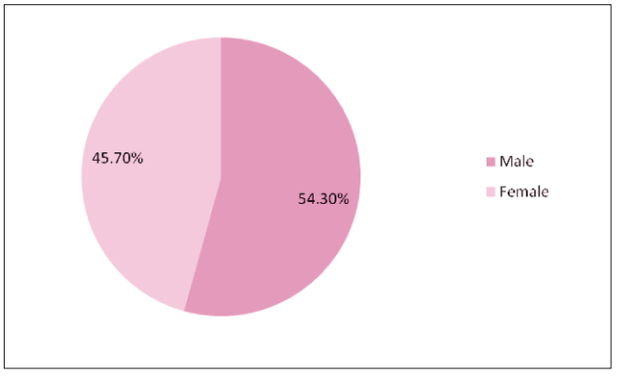

Figure II Sex distribution of ameloblastoma

Figure III Site distribution of ameloblastoma

Table I Distribution of radiographic appearance by age

	Patients' ages (Yrs)						
Type	0-19	20-29	30-39	40-49	50-59	60-69	Total
Unilocular	6	7	3	3	2	1	22
Multilocular	2	3	2	0	2	1	10
Soap-bubble	2	1	0	0	0	0	3

Radiographically, 22 (62.85%) of the 35 cases were unilocular with a well-demarcated border, whereas 10 (28.57%) were multilocular in appearance (Table I). 03 cases exhibited a soap-bubble appearance. If the locules are small, a multilocular lesion can be described as having a soap-bubble appearance. On the basis of established histologic criteria, we observed that 15 (42.85%) of 35 cases exhibited a plexiform pattern and 12 (34.28%) of 35 cases exhibited a follicular pattern (Tables II and III).

Table II Distribution of histologic type by age

	Patients'ages (Yrs)						
Type	0-19	20-29	30-39	40-49	50-59	60-69	Total
Plexiform	6	3	1	3	2	0	15
Follicular	2	7	3	0	0	0	12
Cystic	1	0	0	0	2	2	5
Granularcell	1	0	1	0	0	0	2
Acanthomatous	0	1	0	0	0	0	1

Table III Relationship between radiographic and histologic findings

Histologictype	Radiographictype			
	Unilocular	Multilocular	Soap-bubble	Total
Plexiform	10	2	3	15
Follicular	7	5	0	12
Cystic	3	2	0	5
Granularcell	1	1	0	2
Acanthomatous	1	0	0	1

Discussion

It has been reported previously that unilocular ameloblastomas tend to occur in younger age groups. Our results confirmed this tendency. The unilocular pattern (62.85%) predominated over the other patterns. Moreover, in this study, 22 of the 35 cases of unilocular lesions occurred before the fifth decade of life (Table I). Larsson and Almeren report the incidence of ameloblastoma in Sweden as 0.3 cases per million people per year.[15] The average age of patients with intraosseous ameloblastoma has been reported to be 39 years. In this study, we documented the occurrence of ameloblastomas in a significantly younger age group that has been used in previous studies. The mean age of our patients at biopsy was 30 years (Table I). This variation may reflect ethnic differences or diagnosis within a health care more likely to

have films and so forth. Waldron and El-Mofty reported that in 116 tumors, the male-to-female ratio was 1.2:1, which is in agreement with our results (Figure II).[16] Our study shows that ameloblastomas have a marked predilection for the mandible (94.28%). Waldron and El-Mofty reported that the follicular pattern was the most prevalent (34.28%).[16] However, we found that the plexiform pattern was the most prevalent, it was seen in 15 (42.85%) of the 35 cases. Two patients had changes in granular cells. Granular cells, which have been described as clinical indicators of tumour aggression, were found in the center of the follicular pattern areas.[17] This finding contrasts with the observation that the follicular pattern is the most common pattern in intraosseous ameloblastomas. Waldron and El-Mofty identified 14 examples of the desmoplastic variant, representing 13% of the intraosseous tumors sampled.[16] The desmoplastic pattern was not observed in this study. Radiologic findings showed that 62.85% of cases had unilocular radiolucent lesions. By correlating histologic type with age, we found that most teen aged patients had tumours with a plexiform pattern, whereas most patients in their twenties had tumours with a follicular pattern. By correlating radiographic findings with histologic type, we found that 10 cases are plexiform and 7 cases are follicular tumours manifested with unilocular radiographic findings. The benign nature of ameloblastoma often leads a surgeon to perform simpler extirpative procedures to avoid the potential morbidity associated with larger resections.[18] The diagnosis of unicystic ameloblastoma is made on the basis of a combination of radiographic and microscopic findings. We found that ameloblastomas occurred in younger patients and that a unilocular radiographic pattern predominated.

Conclusions

Amoeloblastomas are common benign odontogenic neoplasms in oral cavity. The biological behavior of this tumour, and a careful clinical examination combined with a through imaging investigation to evaluate the general aspects of the lesions and its margins, as well as its internal architecture and its relationship to adjacent anatomical structures, can assist in treatment planning. These information coupled with the histopathological confirmation of the diagnosis will allow for the selection of the best individual therapeutic approaches, increasing the treatment efficacy in patients diagnosed with this tumour.

Recommendation

Clinical imaging findings aid in the differential diagnosis, histopathological evaluation is essential for the definitive diagnosis of amoeloblastomas. For successful treatment, early diagnosis and detection of the precise boundaries of the tumour is essential.

Acknowledgement

Authors express cordial thanks to all colleagues of department of Oral & Maxillofacial Surgery, Dental Unit, Rajshahi Medical College Hospital, Rajshahi, for their co-operation and constant encouragement to complete the study.

Disclosure

All the authors declared no competing interest.

References

1. Shafer WG, Hine MK, Levy BM. A textbook of oral pathology.4th ed. Philadelphia: WB Saunders. 1983;276-285.

2. Regezi JA, Sciubba JJ. Oral pathology: Clinical-pathologiccorrelations. Philadelphia: WB Saunders. 1989;363-374.

3. Isacsson G, Andersson L, Forsslund H, Bodin I, ThomssonM.Diagnosis and treatment of the unicystic ameloblastoma. Int J Oral Maxillofac Surg. 1986;15:759-764.

4. Lucas's pathology of tumors of the oral tissues. 5th ed. Hong Kong: Churchill Livingstone. 1998;25-32.

5. Eveson JW, Scully C. Color atlas of oral pathology. 1st ed.Barcelona: Mosby–Wolfe. 1995;43-45.

6. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and Maxillofacial Pathology. Philadelphia: WB Saunders. 1995;512-520.

7. Keszler A, Dominguez FV. Ameloblastoma in childhood. J Oral and Maxillofacial Surg. 1986;44:609-613.

8. Ueno S, Nakamura S, Mushimoto K, Shirasu R. A clinicopathologic study of ameloblastoma. J Oral Maxillofac Surg. 1986; 44:361-365.

9. Kahn MA. Ameloblastoma in young persons: A clinicopathologic analysis and etiologic investigation. Oral Surg Oral Med Oral Pathol.1989;67:706-715.

10. McMillan MD, Smillie AC. Ameloblastomas associated withdentigerous cysts. Oral Surg Oral Med Oral Pathol. 1981;51:48996.

11. Eversole LR, Leider AS, Strub D. Radiographic characteristicsofcystogenic ameloblastoma. Oral Surg Oral Med Oral Pathol. 1984;57:572-577.

12. Leider AS, Eversole LR, Barkin ME. Cystic ameloblastoma: A clinicopathologic analysis. Oral Surg Oral Med Oral Pathol.1985;60:624-630.

13. Csiba A, Okros I, Dzsinich CS, Szabo D. Virus-like particles in a human ameloblastoma. Arch Oral Biol. 1970;15: 817-826.

14. Robinson L, Martinez MG. Unicystic ameloblastoma: A prognostically distinct entity. Cancer. 1977;40:2278-2285.

15. Larsson A, Almeren H. Ameloblastoma of the jaws. Acta PatholMicrobiolScand. 1978;86:337-349.

16. Waldron CA, El-Mofty SK. A histopathologic study of 116 ameloblastomas with special reference to the desmoplastic variant. Oral Surg Oral Med Oral Pathol. 1987;63:441-451.

17. Hartman KS. Granular cell ameloblastoma. Oral Surg Oral MedOralPathol. 1974;38:241-253.

18. Sampson DE, Pogrel MA. Management of mandibular ameloblastoma: The clinical basis for a treatment algorithm. J Oral Maxillofac Surg. 1999;57:1074-1077.

Original Article

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 19-22

Prevalence of Oral Habits in 7–13 Years Old School Children in Jashore City, Bangladesh

Md. Sher Ali[1*] Md. Noman Faroq[2] Md. Zakir Hossain[3] Tamanna Begum[4]

Abstract

Background: *Oral habits are repetitive patterns of behavior involving the oral cavity including digit sucking, lip sucking tongue thrusting, nail biting, object biting and bruxism, which has significantt effects on health. The present study was conducted to determine the prevalence of harmful of Oral Habits in 7–13 years-old School Children in Jessore city, Bangladesh.*

Materials and methods: *This was a descriptive-cross sectional study, conducted during the period January to July 2015. Data was gathered from 2500 children of age group 7-13 years, attending different schools of Jashore city. Information pertaining to the study was collected from the parents in the form of questionnaire, followed by the clinical examination of the subjects using torch, disposable mirror and the probe. All data's were analyzed through standard statistical method by using Statistical Package for Social Science Software (SPSS Version-20).*

Results: *Out of 2500 children examined, 23.2% had oral habits, out of which 10.8% children had tongue thrusting habit, 10% had mouth breathing habit followed by thumb sucking 0.6% , lip biting 0.4% , bruxism affected 0.5% and nail biting affected 0.9% of the children examined. There was no significant difference in prevalence of habits between male and female. Prevalence of the oral habit decreased with the increasing age.*

Conclusion: *The overall prevalence rate of oral habits in the present group of children was high. This data will provide the base for planning the preventive strategies in eradicating the oral habits and this will reduce the occurrence of malocclusion in Bangladeshi population.*

Key words

Digit sucking; Mouth breathing; Oral habits; Prevalence; Tongue thrusting.

Introduction

Prolonged habits can have deleterious effects on the occlusion. Some of the negative sequelae associated with prolonged habits like digit sucking and tongue thrusting include a higher incidence of anterior open bite, maxillary incisor protrusion, Class II canine relationship, distal step molar relationship, posterior cross bites, and lip incompetence.[1]

Oral habits, especially if they persist beyond the preschool age, have been implicated as an important environmental etiological factor associated with the development of malocclusion.[2-12] In pre-school children digit and dummy sucking are the predominant habits.[2-7,9] Warren et al reported that 20% of children have a non-nutritive sucking habit beyond 3 years of age.[2] In a long term follow up, Warren et al observed that nonnutritive sucking habits prolonged beyond 4 years caused narrow maxillary arch widths, greater over jets and greater prevalence of open bite and crossbite.[3]

Environmental influences during the growth and development of the face, jaws and teeth consist largely of pressures and forces related to physiologic activity. Pressures against the jaws and teeth will occur during oral activities and could affect jaws grow and teeth erupt.[13]

The prevalence of class II malocclusion and persisting digit sucking in the different age groups. As the duration of the habit increased, the probability of a child developing a class II malocclusion increased. If the habit was stopped early (before 6years), the effects on occlusion were often transitory.[14] Among the environmental factors associated with malocclusion, digit and pacifier sucking were the most significant causes.

Active digit sucking results in reduced vertical growth of the frontal part of alveolar process, which creates an anterior open bite and proclination of the upper incisors as a result of the horizontal force created by the digit. Finger sucking also causes anterior displacement of the maxilla, anterior rotation of the maxilla resulting in an increased

1. Junior Consultant of Orthodontics
Khulna Medical College and Hospital, Khulna.
2. Assistant Professor of Orthodontics and Dentofacial Orthopedics
Chattagram International Dental College, Chattogram.
3. Professor of Orthodontics and Dentofacial Orthopedics (Retired)
Dhaka Dental College, Dhaka.
4. Assistant Professor of Orthodontics and Dentofacial Orthopedics
Dental Unit, Chittagong Medical College, Chattogram.

*Correspondence to :
Dr. Md. Sher Ali
Cell: 01711 14 22 54
Email : dr.sherali@yahoo.com

Date of Receipt : 12-11-2022
Date of Acceptance : 18-12-2022

prevalence of posterior crossbite in the deciduous dentition and proclination or retroclination of lower incisors which seem to be due to the strength of the tightness of the lower lip and tongue activity during sucking.[6]

During adolescence, the habit of mouth breathing may develop from recurrent throat infections, allergic rhinitis or nasal obstruction due to factors such as a deviated nasal septum or other anatomical causes. Long standing mouth breathing and nasal obstruction can adversely affect dento-facial growth.[11]

Materials and methods

This study was a descriptive observational cross sectional study by simple random sampling, the study comprised of 2500 children of age 7-13 years, attending different government and private schools of Jashore city during the Period January and July 2015.

A questionnaire data sheet which was written by Bengali and was supplied to the school children as well as his/her parents.

Each child was asked to fill up the supplied questionnaire data sheet. A thorough history was obtained on a specially designed proforma which included the personal data (Age, sex, and residence) presence or absence of oral habits like thumb/finger sucking, tongue thrusting, mouth breathing, lip biting, nail biting and bruxism.

As there was a possibility that the children or parents were not aware of the tongue thrusting and mouth breathing, the children were diagnosed for these habits on the chair. The child was asked to swallow saliva first and then 10 ml of water. Position of the tongue during swallowing was evaluated by depressing the child's lower lip with the operator's thumbs and simultaneously feeling the masseter muscle activity with the index fingers. Child was diagnosed as a tongue thruster if he/she fulfilled any one of the following criteria established by Weiss and Van Houten.[15]

i) He/she thrusted his/her tongue against the upper central incisors or between the upper and lower central incisors during swallowing.

ii) Swallowed with his/her teeth apart

iii) Had excessive lower lip activity during swallowing.

Child was diagnosed as mouth breather by double ended mirror and water holding test. For mirror test, a two sided mirror was placed below the Childs nostrils and formation of vapors was observed. If it occurred on upper part of the mirror indicates nasal breathing whereas on the lower part indicates mouth breathing.

For water test, child was asked to have a small amount of water in his mouth with lips in contact without swallowing for 3 minutes, those who were unable to maintain the lips in contact position considered as mouth breathers.

Other habits like Thumb sucking, Lip biting, and Bruxism were diagnosed from data collection sheet with necessary information for each subject was filled.

All kinds of habits were selected from collected data sheet and clinical examination. Habits which were selected only from questionnaire the data sheet were filled by Child parents were given priority. Habits which were selected only from questionnaire were thumb sucking, lip biting, nail biting, and bruxism. Mouth breathing and tongue thrusting was evaluated by clinical examination.

Results

Out of 2500 children 1133 were males and 1367 were females (Table I). The prevalence of oral habits among school children in Jashore city was found 23.2%. The prevalence of oral habits derived from this sample is representative of the entire school population of Jessore city in the age group 7-13 years. Among them Tongue thrust was the most prevalent habit affecting 10.8% of children, mouth breathing affected 10% of the population, followed by thumb sucking 0.6%, lip biting & bruxism affected 0.5%and nail biting affected 0.9% of the children examined (Table II).

Overall there were no significant differences in the prevalence of habits between boys and girls. For specific habits, thumb sucking was more common in girls (0.73%) than boys (0.4%). For the mouth breathing and tongue trusting there was a reverse trend in prevalence between boys and girls. It was more common in boys (Mouth breathing13.23% & tongue trusting 14.12%) compared to girls (mouth breathing 7.31% & tongue trusting 8.04%). Lip biting & bruxism did not show any significant difference between boys and girls (Table II).

Table I Distribution of children according to age and sex

Age (Years)	Sex		Total
	Male	Female	
7	183	175	358
8	108	175	283
9	100	137	237
10	148	124	272
11	210	281	491
12	286	308	594
13	98	167	265
Total	1133	1367	2500

This table is showing the number of participants by age wise. Here the table showed that female are more participants than male .Male participants was 1133 and female participants was 1367.More participants was also found in 11 and 12 years children.

Table II Prevalence of oral habits according to sex

Oral habit	Male		Female		Total	
	n	%	n	%	n	%
Thumb-sucking	5	0.4	10	0.73	15	0.6
Mouth breathing	150	13.23	100	7.31	250	10
Tongue thrusting	160	14.12	110	8.04	270	10.8
Lip biting	5	0.4	5	0.4	10	0.4
Nail biting	10	0.8	13	0.9	23	0.9
Bruxism	7	0.6	5	0.3	12	0.5
Total	337	29.55	243	17.68	579	23.2

Table II shows the prevalence of various kinds of oral habits in percentage according to sex. Here the mouth breathing and tongue thrusting habits are more predominant oral habits. Among the all habits tongue thrusting is the height prevalence and more common in male.

Table III Prevalence of oral habits according to age

Oral habit	Age							Total
	7	8	9	10	11	12	13	
Thumb-sucking	10	2	2	1	0	0	0	15
Mouth breathing	14	26	44	65	64	20	17	250
Tongue thrusting	60	50	55	45	26	24	10	270
Lip biting	0	0	1	3	3	2	1	10
Nail biting	1	5	4	5	3	2	3	23
Bruxism	0	2	2	3	3	2	0	12
Total	85	85	108	122	99	50	31	580

Overall there were no significant differences in the prevalence of habits between boys and girls. For specific habits; thumb sucking was more common in girls (0.73%) than boys (0.4%). For the mouth breathing and tongue trusting there was a reverse trend in prevalence between boys and girls. It was more common in boys (Mouth breathing13.23% & tongue trusting 14.12%) compared to girls (Mouth breathing 7.31% & tongue trusting 8.04%). Lip biting & bruxism did not show any significant difference between boys and girls (Table III).

Discussion

The overall prevalence of oral habits in the present study group of children was high due to our socio economic condition and unawareness about the impact of oral habits. But this findings is in agreement with the results of Delhi, North India who found 25.5% of the children presented with an oral habit by Kharbanda et al.[16]

The findings of the study also agree with Prevalence of oral habits in Mangalore-South India was reported to be 29.7% of oral habits by Shetty et al.[17] The cause of this similarity may be their socio-economic condition and health consciousness is near similar to us. Maximum peoples are not aware about the impact of oral habits.

These findings also near agreement with the findings of Gulbarga city India by D.P.Bhayya et al who found 38% of children had oral habits and oral habits in children of Rajnandgaon, Chhattisgarh, India byShetty et al (33.2%) and Quashie-Williams (34%).[18-20]

In this study, among all habits tongue thrusting was the most prevalent oral habits in the present study sample following 10.8% with 14.12% prevalence in boys and 8.04% in female age Group (Table 3.2). Tongue thrusting was the most common oral habit (10.8), which was in accordance with the findings of D.P. Bhayya et al Kharbanda et al.[16]

Mouth breathing can be related to a variety of causes, including enlarged adenoids, tonsils and nasal concha, obstructive nasal septum displacement, allergic rhinitis, nasal or facial deformities and, more rarely, by foreign bodies.[21] The prevalence of mouth breathing in the present study were 10% with 13.23% prevalence in boys and 7.31% in female age group.[21]

Most of the children are engaged in Non-Nutritive Sucking (NNS) habit associated with hunger, shyness, sleeping, psychological development, fatigue, and development of the face and dorsal structure.[22] Thumb sucking was an important oral habit due to their bad impact on malocclusion and arch form. This habit causes v-shaped arches and proclination of anteriors. The prevalence of thumb sucking in boys was 0.4% and 0.73% in girls.

These results were in accordance with the findings of D.P. Bhayya et al and Kharbanda et al demonstrated that thumb sucking was more common and persistent habit in girls than boys. Our findings similar to kharbanda et al. (0.7%).[18,16]

The prevalence of other habits was less in number. Among them nail biting is higher prevalence than others. The prevalence of nail biting was 0.9%. This prevalence is more in girls than boys. The prevalence of nail biting in girls is 0.9% and boys was 0.8%. This finding was similar to Shetty et al 0.3%.[17] they observed Oral habits in children of Rajnandgaon, Chhattisgarh, India –A prevalence study.

The findings of our study near agree with D.P.Bhayya et al (2%) they had done their study prevalence of oral habits in 11-13 year-old school children in Gulbarga city ,India. They found 2% nail biting habit in their study.[18]

The prevalence of lip biting and bruxism is less in number than all other habits. The prevalence of lip biting is 0.4% and bruxism is 0.5%[17]

Conclusion

Oral habits if they persist beyond the preschool age have deleterious effects on occlusion.

The findings of the present study showed that 23.2% of the children had oral habits. Among them Tongue thrust was the most prevalent habit affecting 10.8% of children, mouth breathing affected 10% of the population, followed by thumb sucking 0.6% , lip biting & bruxism affected 0.5%and nail biting affected 0.9% of the children examined.

Recommendation

The various types of oral habits cause various types of malocclusion like crossbite, openbite, proclination, retroclination etc. So it is necessary to take preventive measures against the oral habits. The overall prevalence of oral habits in the present study group of children was high. This data will provide the base for planning the preventive strategies in eradicating the oral habits and this will reduce the occurrence of malocclusion in Bangladeshi population.

Disclosure

All the authors declared no competing interest.

References

1. Samir E Bishara. Text book of orthodontics. 1st ed. Philadelphia: W.B. Saunders Company. 2004.

2. Warren JJ, Levy SM, Nowak AJ, Tang S. Nonnutritive Sucking behaviours in preschool children: A longitudinal study. Pediatr Dent. 2000; 22: 187-191.

3. Warren JJ, Bishara SE, Steinbock KL, YonezuT, Nowak AJ. Effects of oral habits duration on dental characteristics in primary dentition. J Am Dent Assoc 2001. 132: 1685 - 1693.

4. Tomita SE, Bijella VT, Franco LJ. The relationship between oral habits and malocclusion in preschool children. Rev Saude Public. 2000; 34: 299 - 303.

5. Onyeaso CO, Sote EO. Prevalence of oral habits in 563 Nigerian Preschool children age 3-5 years.Niger Postgrad Med J. 2001; 8: 193- 195.

6. Larsson E. Artificial sucking habits: Etiology, prevalence and effect on occlusion. Int J Orofacial Myology. 1994; 20: 10-21.

7. Holm AK. A longitudinal study of dental health in Swedish children aged 3-5 years. Comm Dent Oral Epidemiol. 1975; 3:228 - 336.

8. Kuijpers-JagtmanAM. Effects of sucking habits on the dentofacial development. Ned TijdschrTandheelkd.1989; 96:256 - 258.

9. Farsi NM, Salama FS. Sucking habits in Saudi children: prevalence, contributing factors and effects on the primary dentition. Pediatr Dent. 1997;19: 28 - 33.

10. Tomita NE, Bijella VT, Franco LJ. The relationship between oral habits and malocclusion in preschool children. Rev SaudePublica. 2000; 34: 299- 303.

11. Oulis CJ, Vadiakas GP, Ekonomides J, DratsaJ.The effect of hypertrophic adenoids and tonsils on the development of posterior crossbites and oral habits. J ClinPediatr Dent. 1994; 18: 197 - 201.

12. Khinda V, Grewal N. Relationship of tongue thrust swallowing and anterior open bite with articulation disorders. J IndSoc of PedoPrev Dent. 1999; 17: 33 - 39.

13. William R Proffit. Contemporary orthodontics. 3rded. st. louis. 2000.

14. Popovich F, Thompson GW. Thumb and finger sucking: Its relation to malocclusion, Ain J Orthod. 1973; 63:148-155.

15. Weiss CE and Van Houten JT. A remedial program for tongue thrust. Am J Orthod. 1972;62:499-506.

16. Kharbanda OP, Sidhu SS, Sundaram KR, ShuklaDK. Oral habits in school going children of Delhi:a prevalence study. J Indian socpedoprev dent. 2003; 21 (3): 120-124.

17. Shetty SR, Munshi AK. Oral habits in children: a prevalence study. J indsoc of pedopredent. 1998; 17(2): 61 - 66.

18. D.P. Bhayya T.R. Shyagali Prevalence of Oral Habits in 11–13 year-old School Children in Gulbarga city, India.Virtual Journal of Orthodontics [Serial online]. 2009; 8 (3):1-4.

19. Oral Habits in children of Rajnandgaon, Chhattisgarh, India : A prevalence study byShetty et al International Journal of Public Health Dentistry. 2013:4(1):1-7.

20. Quashie-Williams R, Dacosta OO, IsiekweMC.The prevalence of oral habits among 4 to 15 year old school children in Lagos, Nigerian Journal of Health and Biomedical Science. 2007;6 (1): 78-82.

21. Lauterbach W. Situation-Response (S-R) questions for identifying the function of problem behaviour: The example of thumb sucking. Br J ClinPsychol. 1990;29(Pt 1):51-57.

22. Peterson JE Jr, Schneider PE. Oral habits.A behavioral approach.PediatrClin North Am. 1991;38(5):1289-1307.

Review Article

Chattagram International Dental College Journal

Volume 06 Issue 01 January 2023; 23-29

Modern Gadget Cone Beam Computed Tomography and Its Applications in Endodontics: A Review

Foysal Sirazee[1*] Abu Saeed Ibn Harun[1] Abdullah Al Mahmud[2] Suraiya Ahmed[3]

Abstract

Background: *The use of CBCT in endodontics has been the subject of numerous publications published in recent years, and this diagnostic method is becoming more and more important to have a more precise prognosis of the teeth that need to be treated.The goal of this article is to go over the fundamentals and applications of Conical Beam Computed Tomography (CBCT) in the field of endodontics.*

Materials and methods: *Available studies and abstracts were identified through PubMed, Google Scholar and medRxiv data bases (1982-2020).*

Conclusion: *The use of CBCT would have provided an image of greater diagnostic value in those cases.Additionally, the American Endodontic Association's and the American Radiology Association's joint use guidelines indicate the direction we should go in and the applications we may make of the CBCT for the diagnosis of complicated situations.*

Key words

CBCT; CT scan; Dento-maxillofacial; Endodontics; X-ray.

Introduction

In the realm of dental medicine and surgery, radiographic examination is regarded as one of the most crucial instruments for the evaluation, diagnosis and therapy of pathosis. All patients who attend the dental clinic, even merely for a basic inspection, should have a radiograph taken as a legal record and documentation.[1] A combination of clinical and radiographic examination is now a major key and an important tool used specifically in the field of endodontics to detect the presence of periapical pathosis and also provides information about root canal anatomy and neighboring structures.[2] Over the last 30 years, advances in diagnostic radiology have resulted in the development of new technologies with applications in dentistry. New approaches to dento-maxillofacial treatment and treatment planning have been made possible by advances in hardware and software. Cone Beam Computed Tomography (CBCT) is one such advancement. Cone Beam Computed Tomography (CBCT) is a modern radiological imaging system that is specifically designed for use on the maxillo facial skeleton. CBCT images show the head and neck structures without overlap, allowing the radiologist to clearly identify landmarks. Even though CBCT is now widely used in dentistry, it took several years for the technology to reach this point. It all began in the late 1800s with Wilhelm Roentgen's discovery of x-rays.[3] The use of CBCT in Endodontics is rapidly increasing around the world, as evidenced by position statements published by several specialist societies (European Society of Endodontology 2014, American Association of Endodontists/American Academy of Oral and Maxillofacial Radiology CBCT position statement 2015). CBCT is a three-dimensional reconstruction technique that uses a conical beam to reduce the dose to the patient when compared to conventional CT. Dentists have been studying a 2D representation of a 3D structure, the tooth, for nearly a century. By producing undistorted, three-dimensional images of the area under examination, the system overcomes many of the limitations of conventional radiography. When compared to medical CT, CBCT produces clearer images with higher resolution while emitting less radiation and costing less.[3] It is a smaller, faster, and safer version of the medical CT. A full scan typically takes less than one minute, and the radiation dosage is several times lower than that of a CT scanner. CBCT has become a standard diagnostic tool in endodontic practice.[4,5] Numerous studies have addressed the use and efficacy of CBCT for various clinical indications in endodontics, including: surgical versus non-surgical treatment, pre-operative versus intra and post-operative evaluations, and anterior versus posterior tooth evaluations.[5-8] The goal of this article is to provide an overview of the principles, applications, and benefits of CBCT in the management of various endodontic

1. Associate Professor of Conservative Dentistry and Endodontics Chattagram International Dental College, Chattogram.
2. Assisstent Professor of Conservative Dentistry and Endodontics Sapporo Dental College, Chattogram.
3. Assistant Professor of Dental Public Health (Former) Chattagram International Dental College, Chattogram.

*Correspondence to :
Dr. Foysal Sirazee
Cell: 01819 83 55 82
Email : drsirajee@gmail.com

Date of Receipt : 07-12-2022
Date of Acceptance : 26-12-2022

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023; 23-29

conditions. CBCT images obtained for the management of various endodontic conditions are discussed to provide a better understanding of the imaging system's utility.

Search Strategy

Available studies and abstracts were identified through PubMed, Google Scholar and medRxiv data bases (1982-2020). Key search topic was "Modern Gadget Cone Beam Computed Tomography and Its applications in Endodontics: A Review". The reference list of review articles was also searched. The search term was following key words used in various combination: Cone-Beam-Computed Tomography (CBCT); CT scan; Dento-maxillo facial; Endodontics; X-ray.

Discussion

CBCT Scanner

The first prototype CBCT scanner for angiographic applications was created in 1982.[9] A CBCT scanner for dentomaxillofacial use was developed in the late 1990s and use of this technique has become widespread in dentistry since the first report.[10] A 3D volume of data is acquired using CBCT in a single sweep of the scanner.The technique is based on a straightforward, direct connection between the sensor and the source, which rotates synchronously 180—3608 around the patient's head. The X-ray beam, which is cone-shaped (Hence the technique's name), captures a cylindrical or spherical volume of data, which is referred to as the Field Of View (FOV).[11]

How Does a CBCT Work?

The procedure begins with an emitter that sends a very fine X-ray beam through a collimator (System that from a divergent beam forms a parallel beam). This beam influences the object being studied because it is crossed or irradiated by a percentage of lightning. Detectors collect radiation that has not been absorbed by the object in the form of a spectrum. The X-ray source and the detector are coupled so that they move synchronously. Depending on the CBCT, the detectors can be made of silicon, selenium, or a CCD sensor (Digital analog converter).The purpose of the CCD sensor is to convert analog to digital information, which produces an electrical signal when the detector interacts with the patient's emerging X-rays and converts it into a binary signal that can be processed by software created specifically for each brand of CBCT.When an X-ray is taken, the source-detector assembly spins while capturing a projection or cut of the tooth under investigation. The group rotates the skull numerous times to produce 360-degree photos or slices that are then reassembled to create a three-dimensional image of the skull. Then, using conical beam algorithms, this 2D data is transformed into a 3D volume of data for a PC in any of the 3D planes or a 3D image.[12] Transverse pictures from the CBCT scan are typically produced in the three orthogonal planes. The expert chooses the cut's thickness and location within the data volume. Since the alteration of the cut in one of the planes modifies the rest of the presented planes, the three perspectives can be reviewed simultaneously. PC software can change this to give more detail about areas of interest.[13]

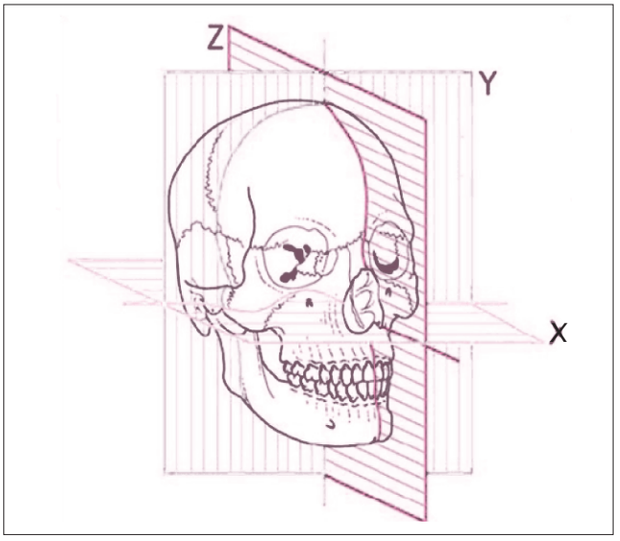

Figure 1 Illustration of the three-dimensional planes

Sagittal Plane: Perpendicular to the ground and parallel to the middle sagittal plane, which divides the body into left and right halves (Z).

Axial Plane: Perpendicular to the longitudinal axis of a body (X). Coronal plane Divide the skull into a ventral part and another dorsal part (Y) (Figure 1).

Axial and proximal views are of value since they are generally not seen on a conventional periapical radiograph.[14]

Classification of CBCT

Cone beam computed tomography is categorized based on the field of view or scan volume as follows:

i) Small volume/limited field or limited volume. This has a volume height of 5 mm.

ii) Single arch. This has a field of view of 5–7 cm.

iii) Inter-arch has a field of view of 7–10 cm.

iv) Maxillofacial CBCT has a field of view of 10–15 cm.

v) Cranio-facial CBCT has a field of view height of 15 cm.[15]

A less used CBCT classification scheme is dependent on the patient's posture (Supine, sitting or standing). The complete maxillofacial skeleton can be photographed using a large volume CT scanner. Examples include NewTom 3G and i-CAT®. Small volume scanners have a field of view that is roughly the same height and width as a periapical radiograph (3D Accuitomo®) at 40 mm (Height) by 40 mm (Diameter).

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023; 23-29

CBCT Versus Conventional CT

Cone beam computed tomography, also known as cone beam volumetric imaging and cone beam volumetric tomography, is an extraoral radiography technique that generates three-dimensional digital radiographic data.[11,16-19.] In traditional CT scanners, the X-ray source and detector rotate 360° around the patient at a rate of around 60 times per minute, directing a thin fan-shaped beam of X-rays through the patient. The distance the patient moves through the inside of the CT scanning machine during this synchronized rotation determines the thickness of each image slice.This produces a series of sectional images, which are then processed by a computer to produce a three-dimensional image of the patient's region of interest.[18-22] In contrast to conventional CT scanners, a narrow cone-shaped beam, rather than a fan-shaped beam, rotates between 180 and 360 degrees (Depending on the model) around the patient's region of interest, capturing a volume of the patient rather than a slice in conventional CT scanners.

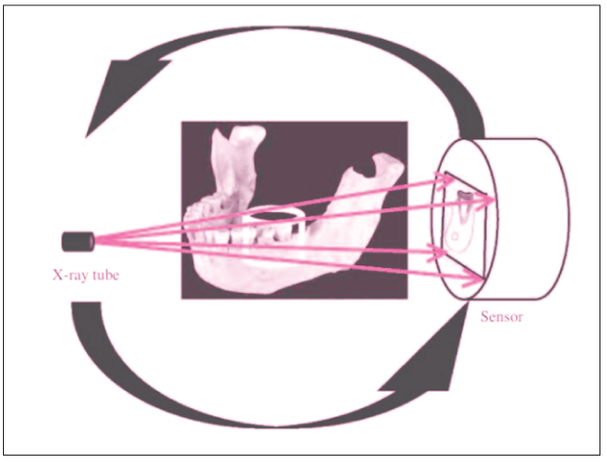

Figure 2 A diagram illustrating the fundamental concept of CBCT. A cone beam source is used by CBCT scanners to acquire the entire area of interest

Cone beam CT also allows for the creation of the desired image in a single rotation without the need to move the scanner or the patient (Figure 2).[18-24] The X-ray field can be collimated to only include the area of interest. This rapid cone beam generation and volumetric image capture can reduce exposure by more than 50 times in some cases.[13,16-20]

In a short period of time, CBCT can produce high contrast images with good resolution. However, soft tissue contrast in these devices is relatively poor.[17,19] As previously stated, the effective dose of CBCT is much lower than that of conventional CT, though the dose is dependent on the volume of tissue irradiated as well as the other imaging parameters chosen.[13,19,21] CBCT scanners are also significantly cheaper than conventional CT scanners. A full list of advantages and disadvantages of CBCT and conventional CT can be found in Table I.

Table I CBCT versus conventional CT – advantages and disadvantages

	CBCT	Conventional CT
Advantages	• Provides accurate cross-sectional information • Short scanning time • No superimposed tomographic blurring • Multiplanar views and 3D reconstruction possible • Uniform magnification • Not technically demanding to perform • Lower dose than conventional CT • PC based software	• Provides accurate cross-sectional information • Short scanning time • No superimposed tomographic blurring • Multiplanar views and 3D reconstruction possible • Uniform magnification • Bone density measurements possible • Soft tissue assessment possible
Disadvantages	• Imaging of entire jaw rather than site of interest in the majority of scanners • Relatively expensive • Amalgam and metallic restorations can cause artefacts • Limited bone density information provided • Not suitable for soft tissue assessment	• Imaging of entire jaw rather than the site of interest • High dose • Amalgam and metallic restorations can cause artefacts • Limited availability • Very expensive

Pixel versus voxel

A pixel is a two-dimensional picture element that is a square that measures between 20 and 60 micrometres in size.[17,18] A voxel, on the other hand, is a three-dimensional volumeelement and is a cube, which may or may not be isometric.[16-18] This is the image volume that has been captured by cone beam CT and then processed and digitized by computer software (Figure 3). The software also allows for the viewing of image volumes as well as image management, manipulation, and interaction.[16-19]

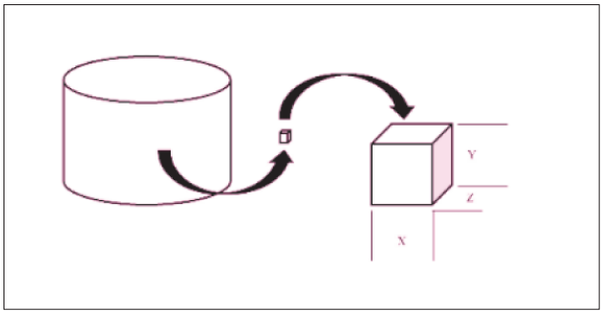

Figure 3 The concept of a voxel.In CBCT, the image volume is made up of voxels that can be as small as 0.08mm in size

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023; 23-29

Sensors

The type of sensor determines important image volume characteristics such as reconstructed volume size, shape, and spatial resolution .[13,16,17,18,24] An image intensifier coupled to a Charged Coupled Device (CCD) or Complementary Metal Oxide Semiconductor (CMOS) a CCD chip or a thin film transistor (TFT) flat panel type of image receptor are among the sensor options. [13,17,18] The signal to noise or signal to glare ratio is one of the most important sensor characteristics that determines the diagnostic superiority of the CBCT machine. This ratio varies depending on the sensor. The signal-to-noise ratio of CCD and flat panel sensors is higher (Better) than that of image intensifier systems.This improves diagnostic accuracy when dealing with scatter caused by metallic elements and prostheses in the maxillofacial skeleton and teeth. CCD and flat panel sensors are smaller and more compact, which reduces the overall weight and size of the CBCT unit and makes it more ergonomic.However, when compared to flat panel and image intensifier sensors, tiny CCD sensors provide smaller reconstructed image volumes, which in turn results in a smaller anatomic field of view.As a result, they are not appropriate for reconstruction of the entire maxillofacial and arch skeletal systems.[13,17,18] Overall, the image intensifier is an older technology and produces a lower quality of image. The flat panel detectors and CCD sensors are the newest image receptors. These offer less image distortion, wider contrast scale and glare elimination when compared with the image intensifier receptors.[1,17,18,24]

Effective Dose of Cone Beam Computed Tomography

Radiation dose of CBCT is dependent on the following exposure parameters:

i) Nature of the X-ray beam (Pulsatile or continuous).

ii) Amount of rotation of the X-ray source anddetector.

iii) Size of the field of view. This can range from a few millimeters to a full scan of the maxillofacial skeleton. There are CBCT devices that provide the whole spectrum. Only a fixed field of vision is offered by some devices. The amount of radiation exposure is often correlated with the field of view, which is further dependant on particular cases. It has been observed that CBCT equipment with a large fixed field of view was insufficient for localized diagnostic tasks covering a small number of teeth.

iv) The type and amount of beam filtration.

v) kV, mA and voxel size.

A three-dimensional representation is typically based on voxel size or the element's volume. Numerous voxels make up the field of view. The voxel size in CBCT equipment ranges from 0.1 to 0.4 mm.[25] Additionally, it is important to note that voxel size might affect diagnoses and that a low-resolution choice, while desired, is likely to reduce spatial resolution owing to motion during scanning. The best exposure, however, is typically obtained by balancing the exposure time with the need for high-quality images. The voltage and exposure duration of the tube current are typically adjusted to achieve this. Small volume/field of view CBCT scanners are appropriate for use in endodontics. [26]Additionally, ex vivo investigations have shown that the effective dose is significantly reduced to half its original amount if the X-ray source and detector are rotated from 360° to 180°.[27,28] For further improvement, the methods for such adjustments are still being developed.

Clinical Applications of Cone Beam CT Scanning within Endodontics

The radiographic examination is an essential part of endodontic management, from the initial diagnosis to the assessment of treatment outcome. CBCT overcomes several limitations of conventional radiograph.

Recommendations According to AAE and AAOMR Joint Position Statement

AAE and AAOMR Joint Position Statement: Use of Cone Beam Computed Tomography in Endodontics—2015/2016 Update.

Recommendation 1: Intraoral radiographs should be considered the imaging modality of choice in the evaluation of the endodontic patient.

Recommendation 2: Limited FOV CBCT should be considered the imaging modality of choice for diagnosis in patients who present with contradictory or nonspecific clinical signs and symptoms associated with untreated or previously endodontically treated teeth.

Recommendation 3 (Pre-Op) : Limited FOV CBCT should be considered the imaging modality of choice for initial treatment of teeth with the potential for extra canals and suspected complex morphology, such as mandibular anterior teeth, and maxillary and mandibular premolars and molars, and dental anomalies.

Recommendation 4 (Intra-Op): If a preoperative CBCT has not been taken, limited FOV CBCT should be considered as the imaging modality of choice for intra-appointment identification and localization of calcified canals.

Recommendation 5 (Post-Op): Intraoral radiographs should be considered the imaging modality of choice for immediate postoperative imaging.

Recommendation 6 (Non-Sxretx): Limited FOV CBCT should be considered the imaging modality of choice if clinical examination and 2-D intraoral radiography are inconclusive in the detection of vertical root fracture.

Recommendation 7: Limited FOV CBCT should be the imaging modality of choice when evaluating the non-healing of previous endodontic treatment to help determine the need for further treatment, such as nonsurgical, surgical or extraction.

Recommendation 8: Limited FOV CBCT should be the imaging modality of choice for nonsurgical retreatment to assess endodontic treatment complications, such as overextended root canal obturation material, separated endodontic instruments, and localization of perforations.

Recommendation 9: Limited FOV CBCT should be considered as the imaging modality of choice for presurgical treatment planning to localize root apex/apices and to evaluate the proximity to adjacent anatomical structures.

Recommendation 10: Limited FOV CBCT should be considered as the imaging modality of choice for surgical placement of implants.[29]

Recommendation 11: Limited FOV CBCT should be considered the imaging modality of choicefor diagnosis and management of limited dento-alveolar trauma, root fractures, luxation and/or displacement of teeth and localized alveolar fractures, in the absence of other maxillofacial or soft tissue injury that may require other advanced imaging modalities .[30]

Recommendation 12: Limited FOV CBCT is the imaging modality of choice in the localization and differentiation of external and internal resorptive defects and the determination of appropriate treatment and prognosis.[31,32]

The decision to order a CBCT scan must be based on the patient's history and clinical examination and justified on an individual basis by demonstrating that the benefits to the patient outweigh the potential risks of exposure to X-rays, especially in the case of children or young adults. CBCT should only be used when the question for which imaging is required cannot be answered adequately by lower dose conventional dental radiography or alternate imaging modalities. Initial studies regarding the use of CBCT for a variety of endodontic related imaging tasks have demonstrated the effectiveness and comparability of CBCT to conventional radiography.[33-37]In general; the use of CBCT in endodontics should be limited to the assessment and treatment of complex endodontic conditions such as:

i) Identification of potential accessory canals in teeth with suspected complex morphology based on conventional imaging.

ii) Identification of root canal system anomalies and determination of root curvature.

iii) Diagnosis of dental periapical pathosis in patients who present with contradictory or nonspecific clinical signs and symptoms, who have poorly localized symptoms associated with an untreated or previously endodontically treated tooth with no evidence of pathosis identified by conventional imaging, and in cases where anatomic superimposition of roots or areas of the maxillofacial skeleton is required to perform task-specific procedures.

iv) Diagnosis of nonendodontic origin pathosis in order to determine the extent of the lesion and its effect on surrounding structures.

v) Intra- or postoperative assessment of endodontic treatment complications, such as overextended root canal obturation material, separated endodontic instruments, calcified canal identification and localization of perforations.

vi) Diagnosis and management of dentoalveolar trauma, especially root fractures, luxation and/or displacement of teeth, and alveolar fractures.

vii) Localization and differentiation of external from internal root resorption or invasive cervical resorption from other conditions, and the determination of appropriate treatment and prognosis.

viii) Presurgical case planning to determine the exact location of root apex/apices and to evaluate the proximity of adjacent anatomical structures.

ix) Dental implant case planning when cross-sectional imaging is deemed essential based on the clinical evaluation of the edentulous ridge.

Endodontic treatment has relied on conventional radiographs for many years. Evidence from various studies has shed light on the shortcomings of this imaging system. The limitations of periapical radiography have been easily overcome by cone beam computed tomography. Studies have highlighted the accuracy of CBCT in endodontics, some common applications included in this study include the detection of periapical lesions, evaluation of endodontic result, complicated tooth morphology, dental trauma, vertical root fractures, pre-surgical assessment, and resorption. The validity and reliability of CBCT in endodontic diagnosis seem to be very high. According to recent research, CBCT is more sensitive than conventional radiography, although both imaging techniques have the same specificity. CBCT can compensate for traditional radiography's shortcomings.[37,38]

Any successful endodontic procedure depends on the accuracy of imaging systems and typically needs radiographic support in three stages: Stage 1—to evaluate the tooth's morphology and periapical lesion before beginning the procedure, stage 2—to take a working length/master cone radiograph and stage 3—to take a post-obturation radiograph. Exposing the patient to CBCT in such simple endodontic cases is not justified.[33] However, when normal periapical radiography is unable to accurately demonstrate root canal morphology and the clinician is unable to formulate a treatment plan that will influence the outcome of the treatment, a limited volume, high-resolution CBCT should be attempted.[36,38]

Optimization and keeping radiation levels as low as reasonably practicable are two important radiation protection principles (ALARP). Always keep the ALARP (As low as reasonably achievable) guideline in mind. Furthermore, CBCT scanners should be evaluated on a regular basis using a quality assurance program.In 2011, the American Association of Endodontists and the American Academy of Oral and Maxillofacial Radiology issued a joint statement stating that CBCT should only be used after weighing the risks and benefits of each exposure. Soon after, the European Commission issued 'evidence-based'guidelines to assist clinicians in justifying the use of CBCT.

Interestingly, due of increased radiation exposure, CBCT cannot be regularly utilized for endodontic treatment. Due to an increase in radiation risk, prescribing CBCT may be a new responsibility for the practitioner.[37,39] Please be aware that CBCT should not be used in place of traditional radiography. It can be employed, however, in some situations where clinical and periapical radiographic evaluation are unclear.Therefore, CBCT offers a cutting-edge way to raise standards of treatment. It is safe to say that a competent practitioner can use CBCT to transform the field of endodontics by increasing the range of diagnostic and therapeutic options. Perhaps the moment has come to formally include CBCT in the arsenal of endodontic techniques.[40]

Conclusion

The relatively new technology of CBCT has given dental radiography a new dimension and is quickly becoming into the gold standard for radiographic exams in dentistry. The value of 3-D CBCT in endodontics is undeniable. Conventional intraoral radiography provides clinicians with a low-cost, high-resolution imaging modality that is still useful in endodontic therapy. However, there are some instances, both pre- and postoperatively, where the understanding of spatial relationships provided by CBCT aids diagnosis and influences treatment. CBCT imaging is no longer debatable it is a valuable task-specific imaging modality and an important technology in comprehensive endodontic evaluation.The use of CBCT is now commonplace in endodontics, where the rise in the proportion of difficult cases justifies its application and the patient's advantages outweigh the hazards.

Disclosure

All the authors declared no competing interest.

References

1. Charangowda BK. Dental records: An overview. J Forensic Dent Sci. 2010 ;2(1):5–10.
DOI: 10.4103/0974-2948.71050.

2. White SC, Pharoah M. Oral radiology principles and interpretation. St. Louis: Mosby Elsevier. 2014;199-212.

3. Scarfe WC, Farman AG. What is Cone-Beam CT and How Does it Work? Dent Clin N Am.2008; 52: 707-730.

4. American Association of Endodontists. American Acadamey of Oral. AAE and AAOMR Joint Position Statement. Use of Cone-Beam-Computed Tomography in Endodontics. Pa. Dent. J. 2011; 78: 37–39.

5. Rosen, E.; Taschieri, S.; Del Fabbro, M.; Beitlitum, I.; Tsesis, I. The Diagnostic Efficacy of Cone-Beam Computed Tomography inEndodontics: A Systematic Review and Analysis by a Hierarchical Model of Efficacy. J. Endod. 2015;41:1008–1014. [CrossRef][PubMed].

6. Schloss, T.; Sonntag, D.; Kohli, M.R.; Setzer, F.C. A Comparison of 2- and 3-Dimensional Healing Assessment after EndodonticSurgery Using Cone-Beam Computed Tomographic Volumes or Periapical Radiographs. J. Endod. 2017; 43:1072–1079. [CrossRef][PubMed].

7. Jeger, F.B.; Janner, S.F.M.; Bornstein, M.M.; Lussi, A. Endodontic Working Length Measurement with Preexisting Cone-BeamComputed Tomography Scanning: A Prospective, Controlled Clinical Study. J. Endod. 2012;38:884–888. [CrossRef] [PubMed].

8. Uraba, S.; Ebihara, A.; Komatsu, K.; Ohbayashi, N.; Okiji, T. Ability of Cone-Beam Computed Tomography to Detect Periapical-Lesions that were not Detected by Periapical Radiography : A Retrospective Assessment According to Tooth Group. J. Endod. 2016;42(8):1186-1190.

9. Robb RA, Sinak LJ, Hoffman EA, Kinsey JH, Harris LD, RitmanEL.Dynamicvolumen imaging of moving organs. J Med Syst. 1982;6:539—554.

10. Mozzo P, Procacci C, Tacconi A, Martini PT, Andreis IA. A newvolumetric CT machine for dental imaging based on the conebeam technique: preliminary results. EurRadiol. 1998;8:1558—1564.

11. Patel S, Dawood A, Whaites E, Pitt Ford T. New dimensions inendodontic imaging: Part 1. Conventional and alternativeradiographic systems. Int Endod J. 2009;42:447—462.

12. Feldkamp LA, Davis LC, Kress JW. Practical cone beam algorithm. Journal of the Optical Society of America. A. 1984;1(6):612-619.

13. Scarfe WC, Levin MD, Gane D, Farman AG. Use of cone beam computed tomography in endodontics. International Journal of Dentistry. 2009;6: 345-367.

14. Kiarudi AH, Eghbal MJ, Safi Y, Aghdasi MM, Fazlyab M. The applications of cone-beam computed tomography in endodontics: A review of literature. Iranian Endodontic Journal. 2015;10(1):16-25.

15. Durack C, Patel S. Cone Beam Computed Tomography in Endodontics. BrazDentJ. 2012;23(3):179–191.

16. Patel S (2009) New dimensions in endodontic imaging: Part 2.Cone beam computed tomography. International EndodonticJournal.2009; 42: 463-475.

17. Miles DA Colour atlas of cone beam volumetric imaging fordental applications.1st ed. Chicago: Quintessence Publishing Co Inc. 2008.

18. McNamara JA, Kapila SD. Digital radiography and threedimensional imaging. 1st ed. Ann Arbor: The University. 2006.

19. Horner K, Drage N, Brettle D. 21st century imaging. 1st ed.London: Quintessence Publishing Co Inc. 2008.

20. Miles DA .Colour atlas of cone beam volumetric imaging fordental applications. 1st ed. Chicago: Quintessence Publishing Co Inc. 2008.

21. Patel S, Dawood A, Pitt Ford T, Whaites E. The potentialapplications of cone beam computed tomography in themanagement of endodontic problems. International EndodonticJournal. 2007;40: 818-830.

22. Horner K, Drage N, Brettle D. 21st century imaging. 1st ed.London: Quintessence Publishing Co Inc. 2008.

23. Patel S, Dawood A, Whaites E, Pitt Ford T.New dimensionsin endodontic imaging: Part 1. Conventional and alternative radiographic systems. International Endodontic Journal. 2009;42: 447-462.

24. Patel S, Kanagasingam S, Mannocci F. Cone Beam Computed Tomography (CBCT) in endodontics. Dental Update. 2010; 37: 373-379.

25. Loubele M, Jacobs R, Maes F, Denis K, White S, Coudyzer W, Lambrichts I, van Steenberghe D, Suetens P. Image quality vs radiation dose of four Cone Beam Computed Tomography scanners. DentomaxillofacRadiol. 2008;37(6):309–318.

26. Loubele M, Bogaerts R, Van Dijck E, et al. Comparison between effective radiation dose of CONE BEAM COMPUTED TOMOGRAPHY and MSCT scanners fordentomaxillofacial applications. Eur J Radiol. 2009;71:461–468.

27. Durack C, Patel S, Davies J, Wilson R, Minnocci F. Diagnostic accuracy of smallvolume Cone Beam Computed Tomography and intraoral periapicalradiography for the detection of stimulated external inflammatory rootresorption. Int Endod J. 2011;44:136–147.

28. Gijbels F, Jacobs R, Sanderink G, De Smet E, Nowak B, Van Dam J, et al. Acomparison of the effective dose from scanography with periapicalradiography. DentomaxRadiol. 2002;31:159–163

29. Tyndall D, Price J, Tetradis S, Ganz S, Hildebolt C, Scarf W. Position statement of the American Academy of Oraland Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasison cone beam computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol. 2012;113(6):817-826.

30. May JJ, Cohenca N, Peters OA. Contemporary management of horizontal root fractures to the permanentdentition: diagnosis, radiologic assessment to include cone-beam computed tomography. Pediatric Dentistry. 2013;35:120–124.

31. Estrela C, Bueno MR, De Alencar AH, Mattar R, Valladares Neto J, Azevedo BC, De Araújo Estrela CR. Method toevaluate Inflammatory Root Resorption by using Cone Beam computed tomography. J Endod. 2009;35(11):1491-497.

32. Durack C, Patel S, Davies J, Wilson R, Mannocci F. Diagnostic accuracy of small volume cone beam computedtomography and intraoral periapical radiography for the detection of simulated external inflammatory rootresorption. Int Endod J.2011;44(2):136-147.

33. Cotton TP, Geisler TM, Holden DT, Schwartz SA, Schindler WG. Endodontic applications of cone-beam volumetric tomography. J Endod. 2007; 33:1121-1132.

34. Lofthag-Hansen S, Huumogen S, Grondahl K, Grondahl HG. Limited cone-beam CT and intraoral radiography for the diagnosis of periapical pathology. Oral Surg Oral Med Oral Path Oral RadiolEndod. 2007;103: 114-119.

35. Cohenca N, Simon JH, Mathur A, Malfaz JM. Clinical indications for digital imaging in dentoalveolar trauma. Part 2: root resorption. Dent Traumatol. 2007; 23(2):105-113.

36. Noujeim M, Prihoda TJ, Langlais R, Nummikoski P. Evaluation of high-resolution cone beam computed tomography in the detection of simulated interradicular bone lesions. DentomaxillofacRadiol. 2009; 38:156-162.

37. Hassan B, Metska ME, Ozok AR, van der Stelt P, Wesslink PR. Detection of vertical root fractures in endodontically treated teeth by cone beam computed tomography scan. J Endod. 2009; 35(5):719-722.

38. Patel S, Brady E, Wilson R, Brown J, Mannocci F. The detection of vertical rootfractures in root filled teeth with periapical radiographs and CBCT scans. IntEndod J. 2013;46:1140–1152.

39. [http://www.sedentexct.eu/files/radiation_pro tection_-172.pdf].

40. Álvarez Mj, Álvaro ZM.Applications of CBCT in Endodontics.DOI: 10.5772/intechopen.89956.

Chattagram International Dental College Journal
Volume 06 Issue 01 January 2023

List of Reviewers (January 2023)

- ☐**Professor (Dr.) M. Jalal Uddin**
  ☐ Head, Department of Community Medicine
  ☐ Chattogram Maa-O-Shishu Hospital Medical College, Chattogram.

- ☐**Professor (Dr.) Mohammad Ali Hossain**
  ☐ Head, Department of Oral & Maxillo-facial Surgery
  ☐ Chattagram International Dental College, Chattogram.

- ☐**Dr. S M Shahadat Hossain**
  ☐ Associate Professor & Head, Department of Prosthodontic
  ☐ Chattagram International Dental College, Chattogram.

- ☐**Dr. Ansar Uddin Ahmed**
  ☐ Associate Professor of Oral & Maxillo-Facial Surgery
  ☐ Chattagram International Dental College, Chattogram.

- ☐**Dr. Md Kamal Hossain**
  ☐ Associate Professor of Bio-Chemistry
  ☐ Chattogram Maa-O-Shishu Hospital Medical College, Chattogram.

- ☐**Dr. Riad Mahmud**
  ☐ Assistant Professor of Prosthodontic
  ☐ Chattagram International Dental College, Chattogram.

- ☐**Dr. Mohammad Lanzur Rahman**
  ☐ Assistant Professor of Orthodontics
  ☐ Dhaka Dental College, Dhaka.

(List is not according to Seniority)

CIDCJ

BMDC Approved

ISSN 2707-2185

CHATTAGRAM INTERNATIONAL DENTAL COLLEGE JOURNAL

206/1, Haji Chand Meah Road, Shamserpara, Chandgaon, Chattogram, Bangladesh.
Phone : +880-31-2573119-23, Fax : +880-31-672062, E-mail : shahique_jpni@yahoo.com
web : www.cidch.edu.bd

DECLARATION

I/We the undersigned, solemnly affirm that I/We have read and approved the article under the title

---

---

submitted for publication in the CIDCJ

I/We further affirm that :

1. The article mentioned above has not been published before nor submitted for publication in any form, in an other journal by me / an of us
2. The authorship of this article will not be contested by anybody else whose names is/are not listed here
3. I/We individually / jointly share the responsibility for the integrity of the content of the manuscript
4. Each of us have generated / contributed to part of the intellectual content of the paper
5. Conflict of interest (If any) has been disclosed
6. We also agree to the authoriship of this article in the following sequence:

Authors name (In sequence)	Signature
1. ----------	----------
2. ----------	----------
3. ----------	----------
4. ----------	----------
5. ----------	----------
6. ----------	----------

Correspondence to : Dr.

Cell :

Email :

Important notes:

1. All the authors are requested to sign this form independently in the sequence mentioned
2. Each author should be able to defend publicly in the scientific community, that intellectual content of the paper for which he/she can take responsibility
3. If the authorship is contested at any state of publication the article will not be processed till the issue is resolved

CHATTAGRAM INTERNATIONAL DENTAL COLLEGE JOURNAL
206/1, Haji Chand Meah Road, Shamserpara, Chandgaon, Chattogram, Bangladesh.
Phone : +880-31-2573119-23, Fax : +880-31-672062, E-mail : shahiq_ipni@yahoo.com
web : www.cidch.edu.bd